CHNOLOGY DEPT.

JULY 1951

Paper Industry

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Nalco 680

STABILIZED *Sodium Aluminate*

100% Soluble

100% Stable • 100% Available

NALCO 680 is *completely* soluble, *completely* stable... the one sodium aluminate that remains in solution as sodium aluminate and does not settle out.

Every ounce of Nalco 680 provides active alkaline alumina... always available for rapid reaction. That means reduced alum requirements, lower acidity, better sizing, better retention, and therefore, better products.

Read the results reported at right—then ask a Nalco Representative to show you how Nalco 680 can repeat them in your mill.

BOX BOARD MILL—Power Savings

"Machine tenders report much better sheet formation with Nalco 680, and that jordans can be cut back 10 amps. Machines are cleaner with no deposits on cylinders."

KRAFT MILL—Alumina Retention

"Improvement in sizing, better retention of alumina, and general texture of the sheet using Nalco 680 are very marked. Converter reports the sheet handles better."

SULFITE BOND MILL—45% Less Alum

"Results using Nalco 680 at the rate of five pounds per ton have been good. Improved sizing and reduced alum from 250 to 140 pounds per 4500 pounds of furnish. This enabled the mill to meet rigid pH specifications for the paper."

TISSUE MILL—Clean Machines

"No. 6 paper machine remaining clean and generally good results through the use of Nalco 680 applied at the rate of four pounds per ton."

NATIONAL ALUMINATE CORPORATION

6232 W. 66th Place • Chicago 38, Illinois

Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario

Nalco

...Serving the Paper Industry through Practical Applied Science

Send for Your FREE Sample

UNUSUAL NEW FAST WET-STRENGTH RESIN

Gives Wet Strength Right Off the Machine
Requires No Special Handling
Adapts to Almost Any Furnish or Product

Prove it to your own satisfaction. Send today for your free sample of UFORMITE 700 fast wet-strength resin, and test it in your rag, sulfite, kraft or groundwood furnish. UFORMITE gives fast wet strength right off the machine—*without* the need for acid pre-treatment, tedious mixing, aging before use, or special corrosion-resisting equipment. And you'll get all these advantages in the bargain . . .

1. **High efficiency** over a wide range of resin-to-pulp ratios.
2. **Adaptability to almost any furnish,** from unbleached kraft to rag.
3. **Wide flexibility** in point of addition, from wire to beater.
4. **Convenient pH control,** with acid, alum, or mixtures of these.
5. **Not critical** to sulfate ion concentration.
6. **Available** in tank car quantities.

Introduced only recently, UFORMITE 700 has already won acceptance in commercial production of Army map paper, heavy weight bag stock, box board, toweling, glassine and twisting tissue. But thanks to our production and raw-material situation, you can still get UFORMITE in tank-car quantities! Your sample is waiting; where shall we send it?

UFORMITE is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

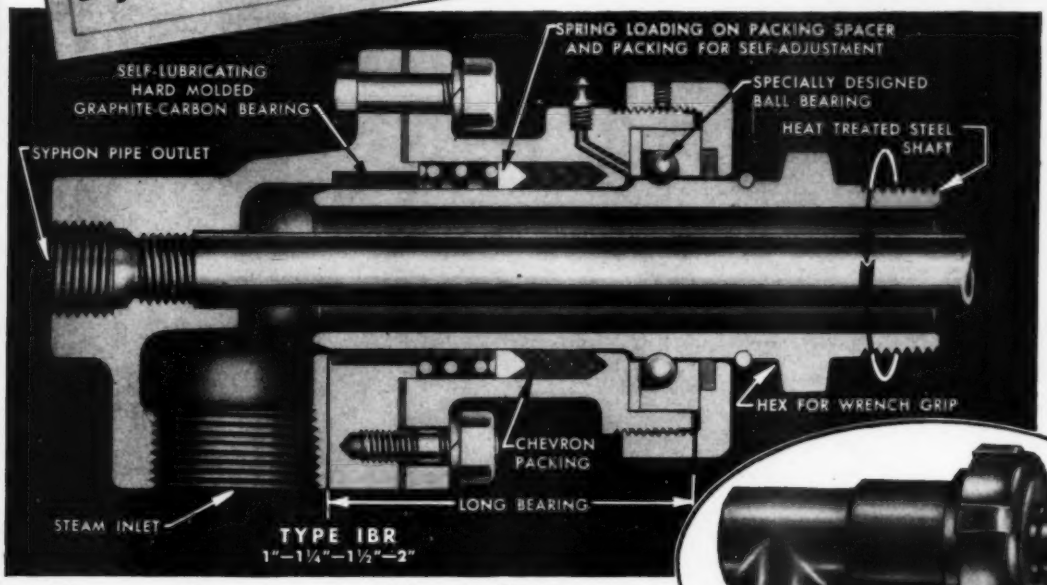
THE RESINOUS PRODUCTS DIVISION

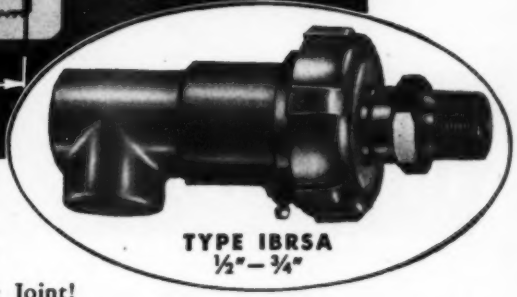
Washington Square, Philadelphia 5, Pa.

Representatives in principal foreign countries

Announcing

The Improved BARCO REVOLVING JOINT





For Paper Machines

Calenders, Corrugators, Dryers

HERE is the new *improved* Type IBR Barco Revolving Joint! Precision-built and field-tested, it has met with enthusiastic approval by machinery designers and operating engineers, alike. Here are some of the reasons why:

LOW TORQUE CUTS POWER COSTS! Wide spacing between bearings holds bearing loads to a low limit and maintains close alignment. Specially designed ball bearing carries both radial and end thrust. Inherent low torque is little affected by pressure, speed, or temperature. Up to 50% power savings.

COMPACT, SIMPLE, LEAKPROOF! Self-adjusting, self-sealing chevron type packing carried under light spring pressure provides a long life seal on specially hardened rotating sleeve, permits remarkably compact construction.

EASY SERVICING, LOW MAINTENANCE! Light running action minimizes wear, permits free-floating installation. No adjusting necessary. Internal parts are readily accessible—usually without removing joint from roll.

For the complete story, send today for new Bulletin No. 300 "BARCO REVOLVING JOINTS." Barco Engineers are at your service; ask for recommendations. BARCO MANUFACTURING CO., 1826 H Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd.

Syphon Style—TYPE IBR. Built for 450°F., steam service to 150 psi, and up to 500 RPM. Hydraulic service to 200 psi, 750 RPM. Higher pressure and speeds under certain conditions.

Single Flow Style—TYPE IBRSA. Similar to Type IBR. Sizes 1" and larger have 2-piece flange connected body.

Other BARCO Revolving Joints

TYPE R and RS — Double row ball bearing construction. Maximum pressure 250 psi (steam) or 500 psi (hydraulic). Syphon and single flow styles.

TYPE V— Small size, light duty, for speeds up to 2500 RPM.

BARCO

THE ONLY TRULY COMPLETE LINE OF FLEXIBLE, SWIVEL, SWING AND REVOLVING JOINTS

Worldwide Sales and Service

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

Insecticide-dusting the modern way.

INSECTICIDES...

one of many uses for CHLORINE

Chlorine is an essential component of many insecticides and weed killers. But it is also in heavy demand for other important uses. To its direct applications as a bleach and as a sanitizing agent are added its constantly expanding use in the manufacture of pharmaceuticals – anti-freeze – chlorinated hydrocarbons for solvents and refrigerants – synthetic glycerine – chlorinated styrene and polyvinyl chlorides for plastics and rubber.

Matching chlorine production with demand is particularly difficult in times like these. Mathieson is increasing its production facilities to provide this basic chemical and many of its derivatives on a broad scale. Consult Mathieson – possibly a program to meet your future needs can be arranged. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 33 • NUMBER 4 • JULY, 1951

Features . . .

Crane & Co. marks 150th year . . . and receives 73rd contract for currency paper 384
Chemical debarking studies begin at Syracuse 391
How Hammermill cuts maintenance costs with electric welding 398
by C. W. Lytton
Why don't your wet felts last longer? 400
by B. F. Shema
How to handle chips with the continuous flow conveyor 404
by Wilbur G. Hudson
Forecasting production improves operations 406
by George G. Saltford
Ohio Boxboard runs successful campaign to stop waste! 408
Centrifugal pumps . . . construction materials—II 411
by Igor J. Karassik and Roy Carter
Potato starch in papermaking processes 413
by Edward E. Stephenson, Jr.
Why by-product power is cheap power 416
by David Moffat Myers

News . . .

Industry-Allied News 384-396
Association News 419-422
Safety News 424
Names in the News 427-430
Necrology 432

Departments . . .

Editorial 375
Current Comment 377
Financial 378
Pictured Highlights 397
Paper Sketches 417
Coming Events 422
Practical Shorts 435
Foreign Abstracts 437-440
New Products 442-445
New Literature 446-450
Current Market Quotations 452-453
Index to Advertisers 454-455

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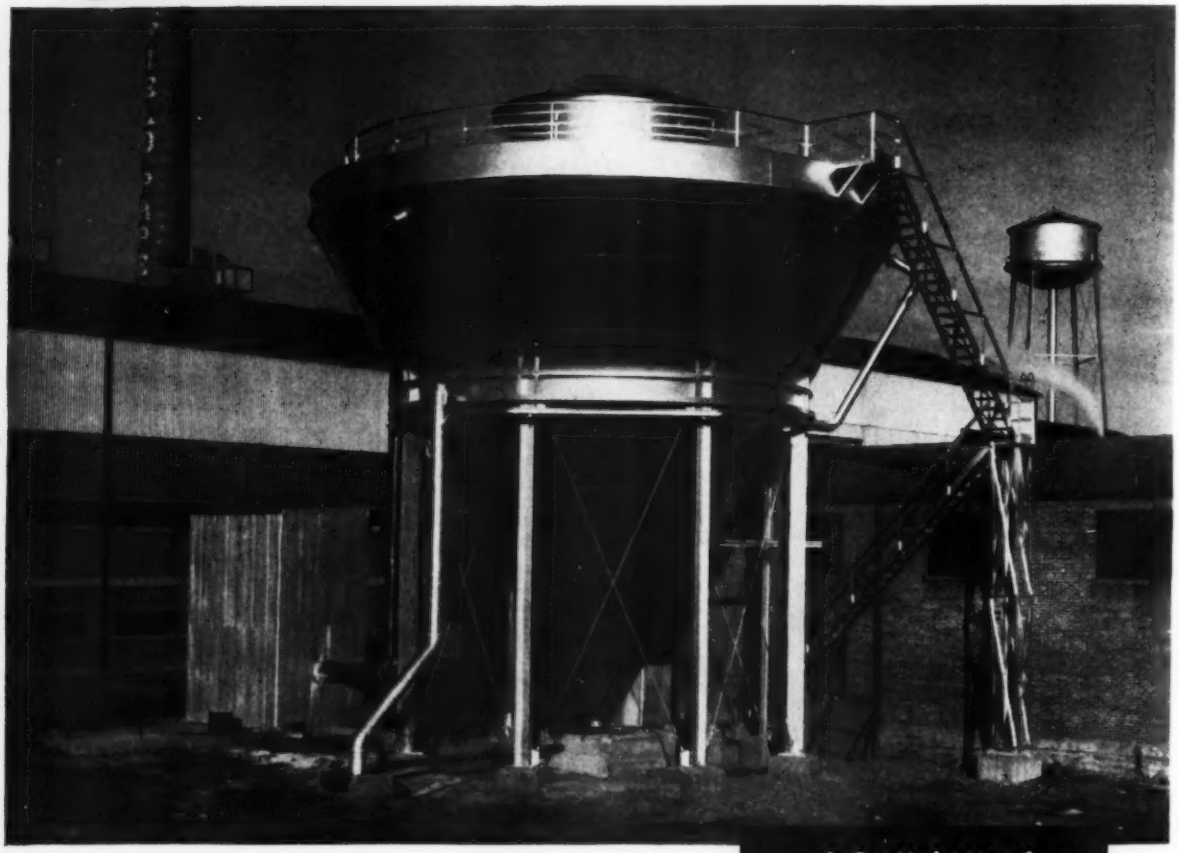
The MARX SAVEALL

for the efficient recovery of waste fibers from whitewater



A Marx Saveall is helping find new profits for a large Ohio container company by recovering waste fibers from whitewater. This economical recovery process has proven thoroughly efficient in many installations throughout the country.

The Marx Saveall consists primarily of two large steel cones—one mounted inside the other. Whitewater fed into the top of the unit overflows on to a deaeration plate where air bubbles are separated from solid particles. These particles slowly settle to the bottom of the unit and are drawn off. The clarified water rises between the two cones, and overflows a circular weir for reuse.

The Marx Saveall is another specialized structure designed by Chicago Bridge & Iron to make new profits for the pulp and paper industry. For details about the Marx Saveall, or other steel plate equipment, write our nearest office.

A Partial List of Other Horton Equipment

ACCUMULATORS
DIFFUSERS
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PULP WASHING TANKS
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Salt Lake City, 4.....527 West 17th South Street
San Francisco, 4.....1547—200 Bush Steet
Seattle, 1.....1327 Henry Building
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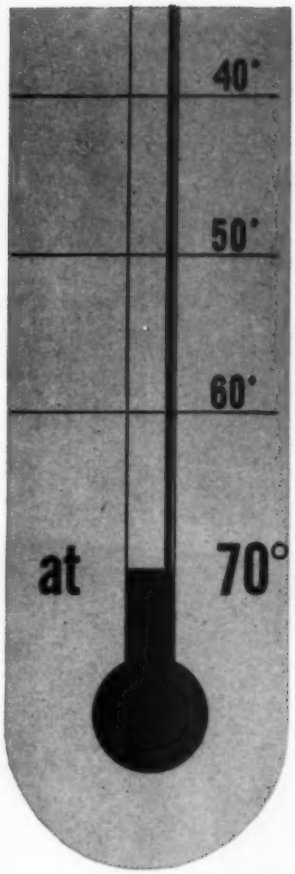
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.



Paper coated with ALATHON TRADE MARK still flexible at 70° below zero

Polythene Resin

There's no embrittlement, no cracking of Du Pont "Alathon" polythene resin . . . even at a temperature as low as minus 70°F. That's why "Alathon" is an ideal coating for frozen-food packages, ice cream containers, and other packages which must withstand low temperatures.

"Alathon" is water-resistant

Package paper coated with "Alathon" gives excellent protection against moisture loss or gain . . . a property which is not altered by sealing, creasing or crumpling. In addition, "Alathon" is chemically inert at room temperatures . . . it's odorless, tasteless and non-toxic . . . important factors in the packaging of foods.

"Alathon" is tough and strong

Thin coatings of "Alathon" on kraft, glassine and other papers are exceptionally durable and have good scuff resistance. Moreover, it's economical to use "Alathon" for many coating purposes. Because of its low specific gravity (0.92), one pound of "Alathon" will cover 30,000 square inches of paper with a 1-mil coat. So why not evaluate . . .

"Alathon" for more sales in the future

Because of its outstanding chemical and physical properties, manufacturers and processors of many kinds of industrial and consumer goods will want paper coated with "Alathon" for their packaging material.

Present demand exceeds our production. But by planning now, you'll be able to move fast when "Alathon" is available. Write for more information about Du Pont "Alathon" polythene resin . . . or for technical assistance. We'll be glad to help you.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY
Polychemicals
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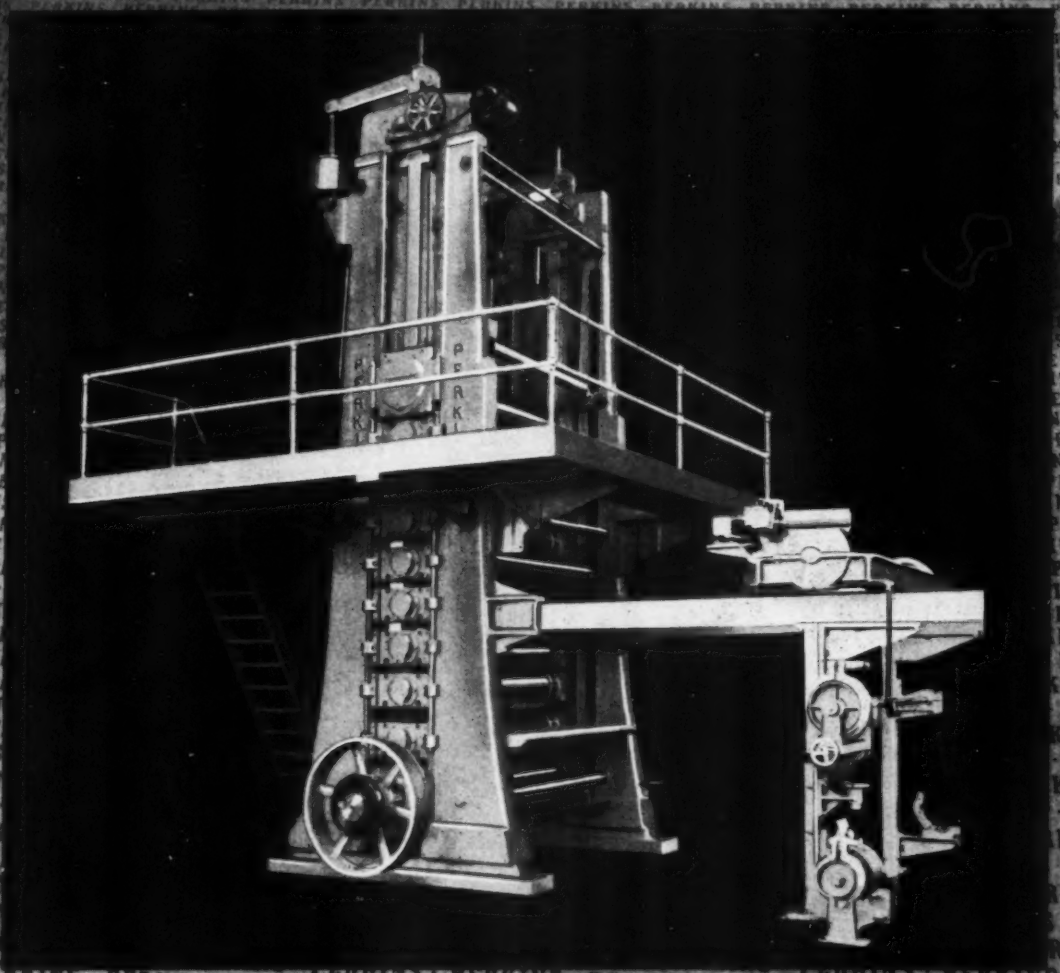


TEN TO FOURTEEN

Perkins ten-roll 64″ face Web Supercalender with provision for fourteen (14) rolls.

- All rolls in Timken anti-friction bearings
- Stationary reel with electric hoist
- Lever pressure with pneumatic loading
- Fly rolls mounted in self-aligning anti-friction bearings
- Motor driven hoist for raising and lowering rolls

B. F. PERKINS & SON, Inc.

HOLYOKE, MASS., U.S.A.

LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

NO ROOM FOR "Trial and Error"

when you're buying VALVES

You're right the *first* time when you install Powell Valves

Powell makes valves precisely engineered to suit each and every industrial flow control service. Powell Engineers will be glad to help you select the *right* valves to meet *your* requirements.

Gate, Check, Globe and Y Valves, in Bronze, Iron, Steel and Corrosion-Resisting Metals and Alloys

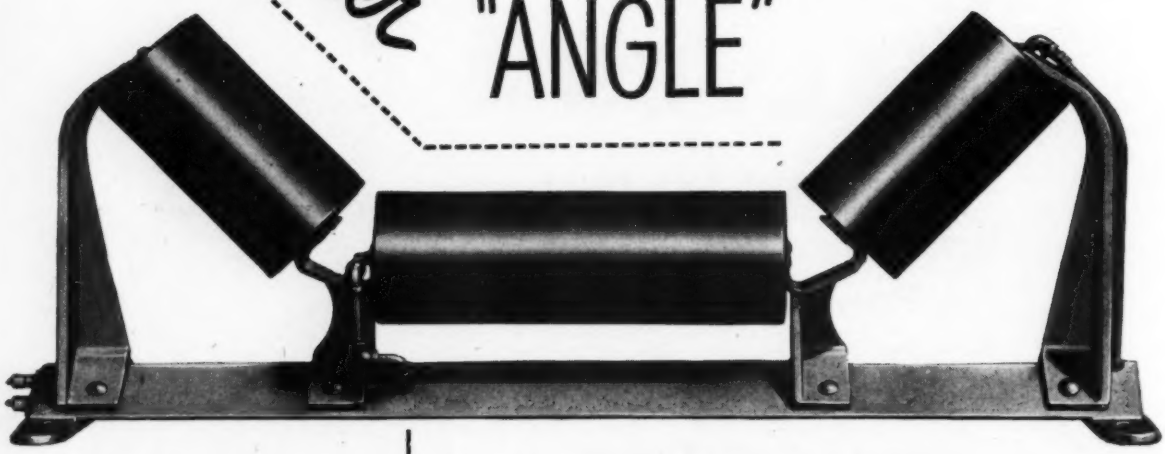
Quality fine throughout "The Line"

Fig. 1793. Large 125-pound Iron Body, Bronze Mounted Gate Valve for low pressure steam, oil, water and gas services. Sizes 2" to 30", incl.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

here's a better "ANGLE"



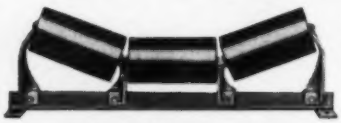
for handling your wood chips!

Here's an idler that's "custom-made" for handling wood chips. It's the Rex Style No. 46 Troughed Belt Wood Chip Idler. The end rolls are sloped at a 45° angle instead of the 20° angle of conventional idlers. To receive full advantage of this idler construction and longer belt life a very flexible type of belt must be used. Loading much closer to the belt edge results in increased capacity without increasing the chance of spillage.

No. 46 Troughed Belt Wood Chip Idlers contain all the outstanding Rex advantages that mean minimum service cost . . . maximum service life. Triple labyrinth grease seal, tapered roller bearings, interchangeable rolls, large grease reservoir and unrestricted passage to both bearings . . . these are a few of many Rex features that mean lower maintenance cost and important savings to you in longer Belt Idler life.

For all the facts, call your nearest Chain Belt Field Sales Engineering Office or write to Chain Belt Company, 1714 W. Bruce Street, Milwaukee 4, Wis.

Other Rex Belt Conveyor Idlers



Rex Standard Troughing Idlers

Rex Flat Belt Idlers

Rex Return Idlers

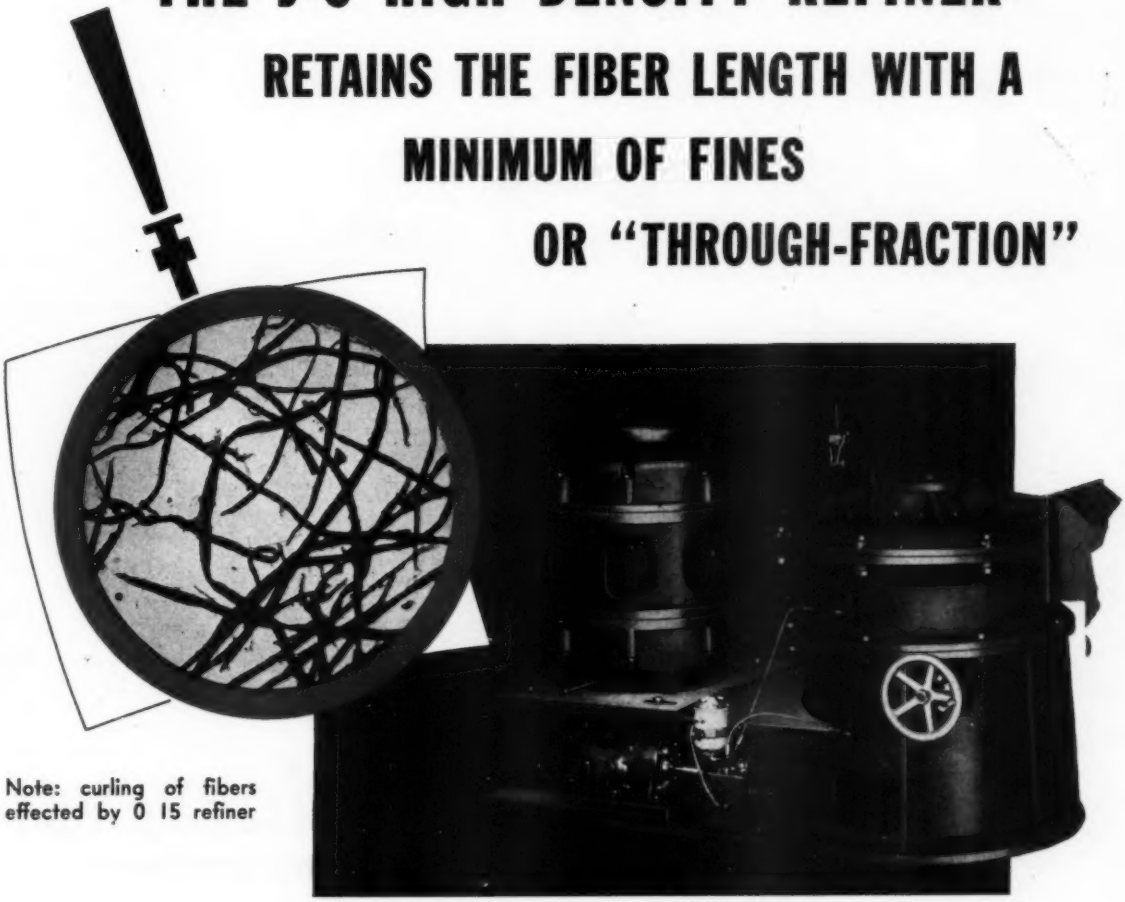
Many other types of Rex Idlers are also available as well as a complete line of pulp and paper mill chains, wood and refuse conveyors, white water recovery equipment and process and waste screening equipment.

CHAIN BELT REX COMPANY ®

BELT CONVEYOR IDLERS

THE J-C HIGH DENSITY REFINER

RETAINS THE FIBER LENGTH WITH A MINIMUM OF FINES OR "THROUGH-FRACTION"



Note: curling of fibers effected by 0 15 refiner

USES: Defibering groundwood secondary screen rejects • Deshiving screened stock (groundwood)—chemical or semi-chemical • Defibering kraft and sulphite tailings • Will operate over a broad range of consistencies, but the specific power is exceptionally low at densities of 25% or higher • Self-cleaning—never plugs at any density • Has an inherently high capacity • Requires a minimum of floor space • Develops high mullen, tear and fold • Low in first cost and maintenance • Available in two sizes —with capacity of 25/50 tons/day or 75/150 tons/day • Used for introducing bleach solution uniformly into high density groundwood in the peroxide process • Develops appreciable curling as shown in photomicrograph above.

Manufacturers of the Zenith Continuous Pulp Press—Zenith Pulp Washer—High Density Refiner—Direct Heat Evaporator

J·C

A PRODUCT OF

JACKSON & CHURCH CO. • SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

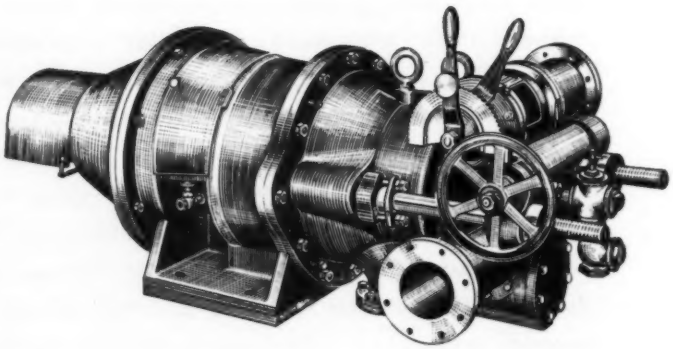
"we're ordering *More* MORDENS"

50% or better of the Morden "Stock-Makers" ordered during the last four years have been on repeat orders from old customers. Customers who have proved "Stock-Makers" superior performance in comparison with other equipment.

Nearly 500 "Stock-Makers" have been installed throughout the world during the last 15 years. Over 400 of these "Stock-Makers" have been installed during the last 4 years.

Such universal acceptance of "Stock-Maker" argues well for your investigation of the benefits to be gained from "Stock-Maker's" beating and refining.

MORDEN STOCK MAKER
TRADE MARK



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In Europe: Millspaugh, Limited . . . . . Sheffield, England
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Watch her reach for the COLORED tissue...

Your tissue products get a quick pick-up in sales volume—when they're in *color*. Because color sets any tissue product apart from a crowd of "look-alikes" . . . makes a *distinctive* difference to the consumer.

Colored facial tissue looks more attractive in a woman's handbag—looks softer, more absorbent. Pastel-shaded toilet tissue blends with bathroom color schemes—becomes a part of the decorative plan. Same goes for paper towels and napkins. Every tissue product becomes more attractive—more desirable—when it's in color.

Your customers are more and more color-conscious. So give them eye-catching tissue products perked up with color—and watch your sales picture brighten! Our Technical Staff will be glad to help you find the right color . . . and the right method of application . . . for any of your tissue products. For complete information, write today to:
E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Div.,
Wilmington 98, Del.

PONTAMINE® YELLOW 5XG
PONTAMINE® FAST YELLOW RL
PONTAMINE® FAST SCARLET 4BA and 4BS Conc. 150%

PONTAMINE® FAST ORANGE WS Conc. 175%

PONTAMINE® SKY BLUE 6BX Conc. 150%

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More color makes more business ...for your customers and you

Du Pont Dyestuffs
DU PONT
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Illustration from the Bettmann Archive

Paperboard Salesman—Model 1810

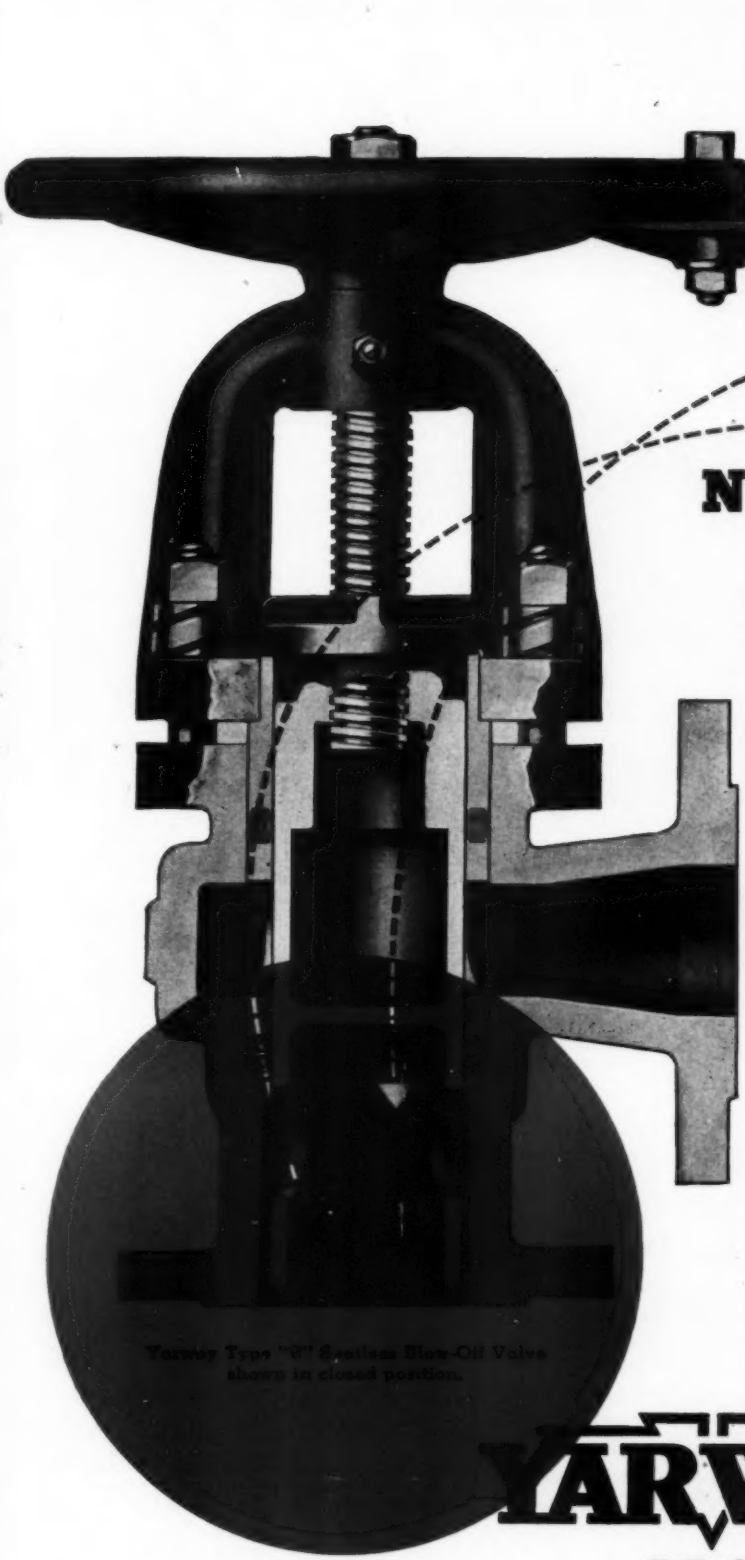
The French, mindful of their finery, were the first to fashion sturdy boxes of paperboard for ladies' and gentlemen's hats. Built up by hand from multiple layers of paper, the board was shaped and moulded into boxes, some of them finished with a plain glazed surface, some with decorations. Then the salesman with his loaded display of paperboard boxes would call his wares through the streets of Paris.

Hat boxes, not much changed in design after 140 years, are still widely used for millinery and men's hats. But the once precious paperboard, now produced by modern high-speed methods, low in cost and plentiful, today protects just about every commodity used by business and the home. For packaging, for shipping, for sanitary protection, for display, for convenience, paperboard cartons and containers are the indispensable carriers of modern merchandise. No wonder paperboard accounts for nearly one-half the total production of the American pulp and paper industry.

The dramatic story of paper is told in the sound-and-color film, "Paper — Pacemaker of Progress," and in a book under the same title. Both are presented by F. C. Huyck & Sons as a tribute to the Paper Industry. The book will be sent free upon request.

HUYCK *Felts*

F. C. HUYCK & SONS • *Kenwood Mills* • RENSSELAER, N. Y.



Yarway Type "S" Seatless Blow-Off Valve shown in closed position.

WHAT?

NO SEAT?

● That's right! In this Yarway Blow-Off Valve there is no seat to score, wear, clog and leak.

The unique balanced sliding plunger design eliminates a common cause of blow-down valve trouble—the seat. Many boiler shut-downs are saved . . . power interruptions avoided . . . production speeded.

Latest metallurgical improvements also make Yarway the ideal blow-off valve for difficult service where acid washing is used.

Yarway Seatless Blow-Off Valves are available singly or in tandem combinations for all pressures up to 1500 psi. For higher pressures up to 2500 psi, specify Yarway Stellite-seat valves.

For the latest information on blow-off valves, get Yarway's newest catalog—B-424 for pressures to 400 psi, B-433 for higher pressures.

YARNALL-WARING COMPANY
149 Mermaid Avenue, Philadelphia 18, Pa.
Branch Offices in Principal Cities

YARWAY

BLOW-OFF VALVES

STOP BLOW-DOWN TROUBLES—KEEP BOILERS ON THE GO

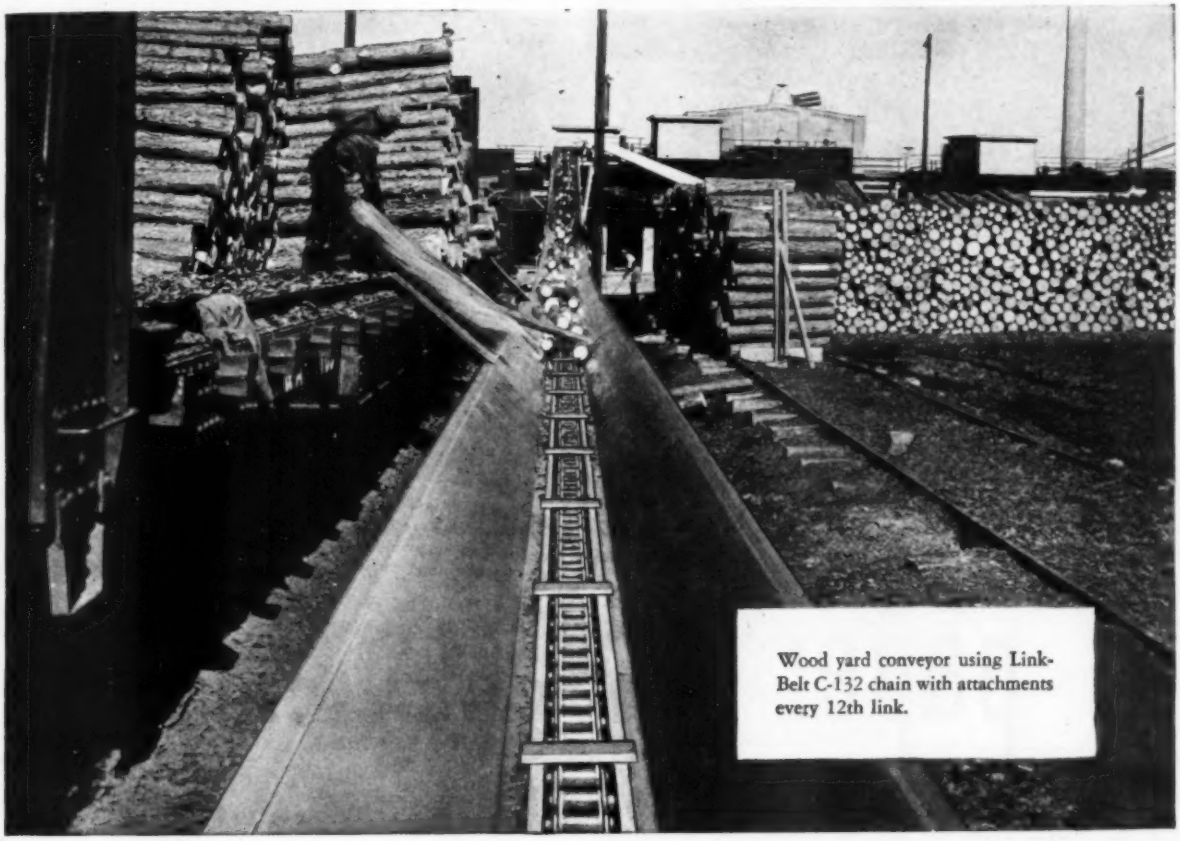
VALUE in a fine product reflects the experience and skills of its makers.

VALUE in Fourdrinier wires is a matter of record... paper quality and production records in mills throughout America reflect the fact that *Appleton Wires are Good Wires!*

APPLETON WIRE WORKS, INC.
APPLETON • WISCONSIN

No ONE chain serves every purpose

LINK-BELT makes all types of chains



Wood yard conveyor using Link-Belt C-132 chain with attachments every 12th link.

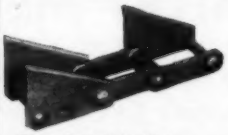
...recommends the right one for your job

Typical chains from the complete Link-Belt line

Class H drag chain—for drag conveyors, handling materials and refuse in runways or troughs.

Class 400 pintle chain — cast links with closed pin joint, for light conveyor, elevator or drive duty.

Class SS bushed roller chain with offset sidebars —for heavy drive service at moderate speeds.



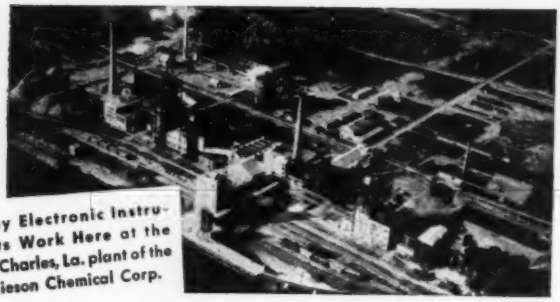
Class C combination chain — popular, durable, low cost design for elevators, conveyors.

More than strength — more than length — all operating qualities are taken into consideration by Link-Belt engineers when they recommend a chain for your job. From the world's most complete line of chains, they can select the *right type* to meet your specific requirements — large or small. Link-Belt builds them all. And all are built to the highest standards. Exact control of materials and manufacturing processes is your assurance of longer chain life. 12.327-C

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

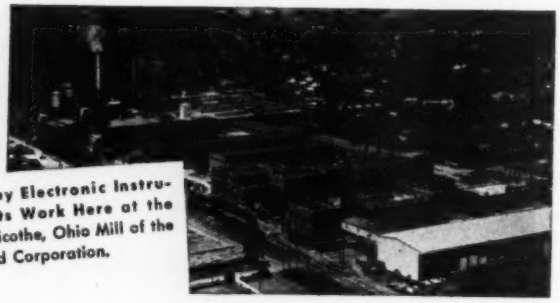
CHAINS AND SPROCKETS



Bailey Electronic Instruments Work Here at the Lake Charles, La. plant of the Mathieson Chemical Corp.

Bailey Electronic Instruments Work Here at the Kodak Park plant of Eastman Kodak Co., Rochester, N.Y.

alkali OR FILMS



Bailey Electronic Instruments Work Here at the Chillicothe, Ohio Mill of the Mead Corporation.

Bailey Electronic Instruments Work Here at the Midland, Michigan plant of The Dow Chemical Company.

paper OR CHEMICALS

★ No matter what you process it will pay you to check into the Bailey simplified electronic control system.

With four basic circuits and eight basic component parts you can get more than 100,000 different electronic instrument and control combinations. Your problems of measuring and controlling flow, level, speed, pressure temperature, gas analysis, pH, conductivity, etc., can be solved by the right combinations of these 4 circuits and 8 basic parts.

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America's TREES

Manpower, too

A lot of men talk about conservation, but the engineers at the St. Joe Paper Company really did something about it. Back in March, 1950, they put the Sutherland High Yield Sulphate System into operation in their 400-ton-per-day pulp mill at Port St. Joe, Florida. At the end of the year, here's what they'd saved:

26,200 cords of wood
Equal to 200,000 trees 10" in diameter

160,000 man-hours
for cutting and loading

These figures are based on a 20-percent increase in pulp yield, and cover less than a year's operation. During 1951, the engineers estimate that a 25-percent increase above normal yield will conserve 3,250 carloads of wood and a correspondingly greater number of man-hours.

In this hour of crisis, America's very existence depends on the vision of its engineers . . . men like those at St. Joe, who are constantly looking for better ways to utilize our resources of men and material in the fight for freedom.

For more information on this modern method of slashing pulp costs, write or wire.

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continuous beating systems

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PAPER FROM POTATOES!

How much?

Maine, the state of "inexhaustible forests," is reported to be making paper products from its surplus crop of potatoes, some 30,000,000 bushels.

This may be a good way to dispose of the surplus goobers, but it doesn't go far toward easing the shortage of paper and board. There is a lot of water in a potato compared with the small amount of fibre.

Removal of water is the business of Hamilton Felts. Whether you are using pulp of spruce, loblolly, old newspapers and cartons or potatoes, you will find a Hamilton Felt that will remove the water faster and at lower cost.

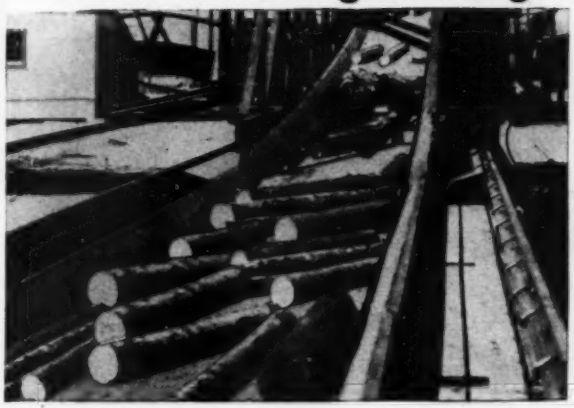
Hamilton Felts

MIAMI WOOLEN MILLS

Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO

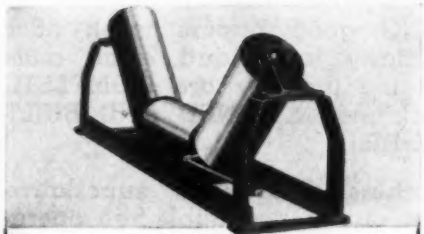
LINK-BELT engineering experience...



PULPWOOD LOGS are carried on log handling belt conveyor to stacker which discharges pulpwood to stockpiles.

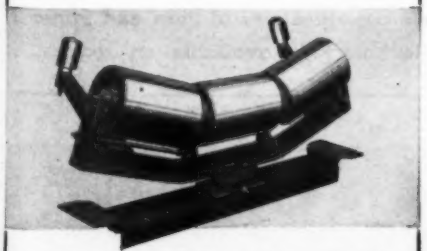
TRANSFER of wood chips from one Link-Belt belt conveyor to another, both using 45° troughed belt idlers.

Plus LINK-BELT quality components...



45° TROUGHED BELT IDLERS for wood chips carry larger volume per lineal foot, resulting in lower cost per ton handled.

SERIES 100 TROUGHED BELT IDLERS. Strong, balanced integral rolls revolve on high-grade roiler bearings, Grease-in, dirt-out seal, large reservoir preserve lubricant.



BELT-TRAINING IDLER for automatic belt positioning. The actuating rolls respond to slightest contact — quickly recede and center the belt to minimize wear.

...add up to your best bet in

BELT CONVEYORS

FOR logs, chips, chemicals and other bulk materials, Link-Belt Belt Conveyors pay off in high capacity and low-cost handling.

Whatever the conditions, you'll find the right answers at Link-Belt. For Link-Belt designs conveyor systems to meet your requirements. Backed by unmatched materials handling and power transmission experience, our conveyor specialists help you and your consultants get the right equipment in the right place.

One Source—One Responsibility

Link-Belt makes all the various elements—all types and sizes of idlers, takeups, pulleys, trippers, bearings and power transmission drives. Plus all related equipment—other types of conveyors, feeders, elevators, car dumpers and shakers.

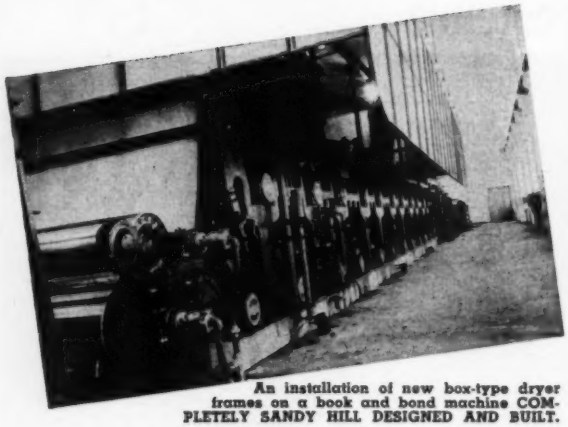
And Link-Belt will build your supporting structures and enclosures . . . install the job completely. One source — one responsibility. Every detail receives the proper attention to assure you an efficient, trouble-free, long-life conveying system.

The next time you need belt conveyor engineering assistance, call the Link-Belt specialist in our office near you.

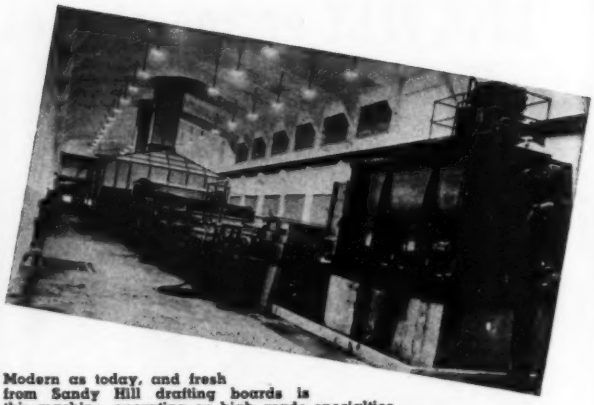
LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities. 12,512

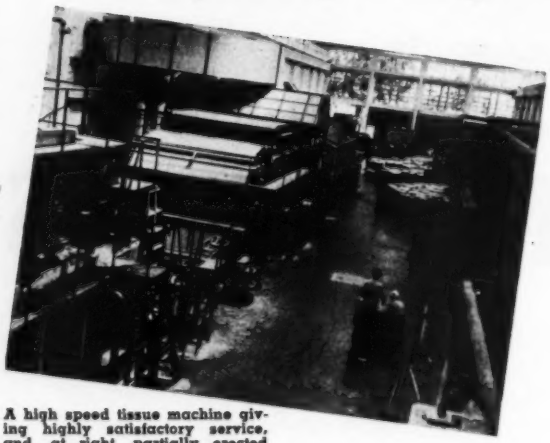


An installation of new box-type dryer frames on a book and bond machine COMPLETELY SANDY HILL DESIGNED AND BUILT.



Modern as today, and fresh from Sandy Hill drafting boards is this machine, operating on high grade specialties COMPLETELY SANDY HILL DESIGNED AND BUILT.

Completely Designed and Built by *Sandy Hill*



A high speed tissue machine giving highly satisfactory service, and, at right, partially erected machine - glazed board machine, both COMPLETELY SANDY HILL DESIGNED AND BUILT.

Press section of a completely new machine recently put in operation. COMPLETELY SANDY HILL DESIGNED AND BUILT.

PRODUCING good papers week after week in many large and small mills throughout the industry are COMPLETE paper machines DESIGNED AND BUILT BY SANDY HILL.

These machines and their superlative records for continuous trouble-free operation, are evidence of the established importance of Sandy Hill in the industry.

Another gratifying indication that Sandy Hill is doing a real job is the growth of the Sandy Hill organization. Today Sandy Hill's personnel of experienced engineers and skilled craftsmen numbers ten times what it did only fifteen years ago.

When you start to plan changes in your mill, then is the time a Sandy Hill sales-engineer can be of great service whether it be a complete machine or a minor piece of specialty equipment.

Sandy Hill's new Brochure of Pulp and Paper Making Machinery is available on request.

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Hudson Falls, N. Y.

Machinists and Founders Specializing in Paper and Pulp Mill Machinery

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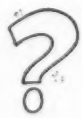
Carbon, Alloy and Stainless steel tubes are defined under CMP regulations as "controlled materials". As such, they are critical materials. Not being a mind reader, "Mr. Tubes"—your B&W Tube Company representative—needs a *close* look at the following facts in order to supply the available tubing most economically suited to your requirements.

1 All related CMP authorizations and government contract numbers.



2 Any acceptable alternates in type, finish, composition, and size.

3 A brief, informative description of your intended fabricating methods.

4 A description of the end-use, exact as to product and its service.

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Our Technical Service Department is always available to help you realize the most from your supply of TITANOX pigments. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments, Ltd., Montreal 2; Toronto 1.

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simplifying heat exchanger problems in the paper and pulp industries

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The fact that Ross stocks fully standardized, mass-produced components and subassemblies for quick assembly into pre-engineered, standard designs and sizes (or to individualized specifications where necessary), contributes materially to simplification and cost-reduction of heat exchanger requirements in the paper and pulp industries.

Engineering time for each application is considerably reduced. Fully standardized components eliminate individualized fabrication. Both favor improved deliveries. Interchangeable, replacement parts for any eventualities are always readily available.

These benefits apply to numerous paper mill applications . . . to the lube oil and jacket water coolers on Diesels . . . to the exchangers on the hydraulic control panels of drying machines . . . to the lube coolers on calenders and large centrifugal pumps, to name a few.

A Ross heat exchanger engineer in your locality will consider your problems with you or your consulting engineers without obligation, at your request. Specific literature, describing the Ross line best suited to your particular equipment or process, will be dispatched promptly. Write.

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dryer felts

PROMOTE EVEN DRYING

Since one of the major factors in even drying is the proper balance of porosity and absorbency in the dryer felts, we produce a wide variety of weaves. It is our aim to provide a felt which will help achieve superior drying of the grade *you* produce under *your* mill conditions.

Economy in the long run

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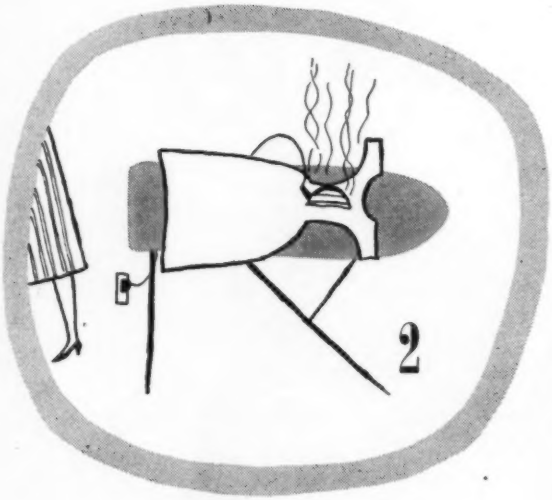
Purecal irons out coating problems



Is your paper coating as uniform as you'd like? Is it always consistent? Does it allow your equipment to operate at high speeds?

Chances are Purecal* can help. You see, Purecal stabilizes and regulates coating viscosity. If you use other carbonates or clay, even small additions of Purecal will improve your coating. Added to clay alone, it lets you run at higher speeds with less down-time. Added to other calcium carbonates and clay, it irons out the variations they cause. You save money. In addition, you get a coating that's uniform in thickness.

This isn't "blue-sky" we're talking. We've got proof of what Purecal can do. Let us show it to you.

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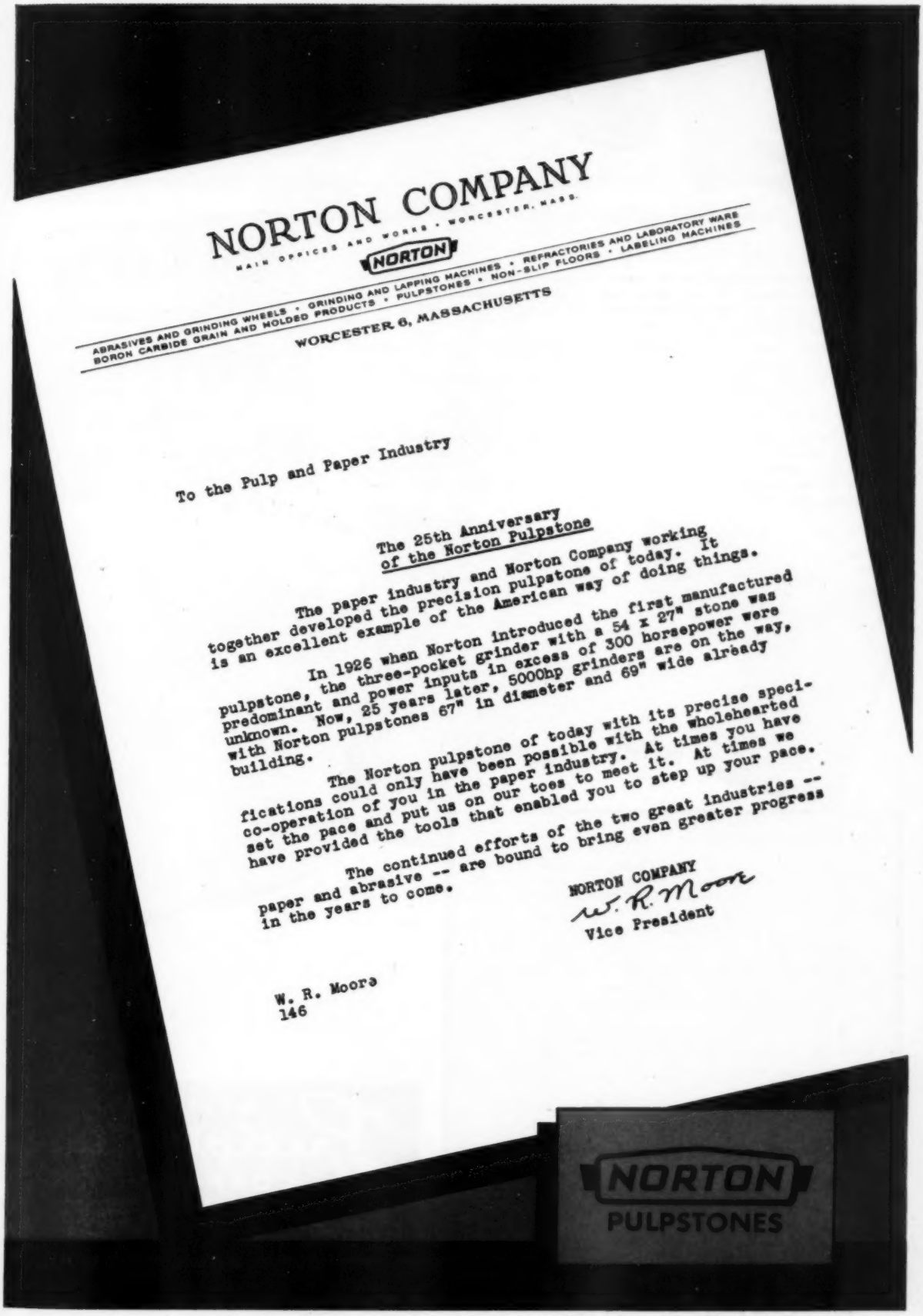
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To the Pulp and Paper Industry
The 25th Anniversary
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The paper industry and Norton Company working together developed the precision pulpstone of today. It is an excellent example of the American way of doing things.
In 1926 when Norton introduced the first manufactured pulpstone, the three-pocket grinder with a 54 x 27" stone was predominant and power inputs in excess of 300 horsepower were unknown. Now, 25 years later, 5000hp grinders are on the way, with Norton pulpstones 67" in diameter and 69" wide already building.
The Norton pulpstone of today with its precise specifications could only have been possible with the wholehearted co-operation of you in the paper industry. At times you have set the pace and put us on our toes to meet it. At times we have provided the tools that enabled you to step up your pace.
The continued efforts of the two great industries -- paper and abrasive -- are bound to bring even greater progress in the years to come.
NORTON COMPANY
W. R. Moore
Vice President
W. R. Moore
146
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PULPSTONES

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From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

28 PAGES
of helpful facts to know about
COTTRELL ELECTRICAL PRECIPITATORS

Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as . . .

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- Mechanical and Electronic Rectifiers.
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. . . and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

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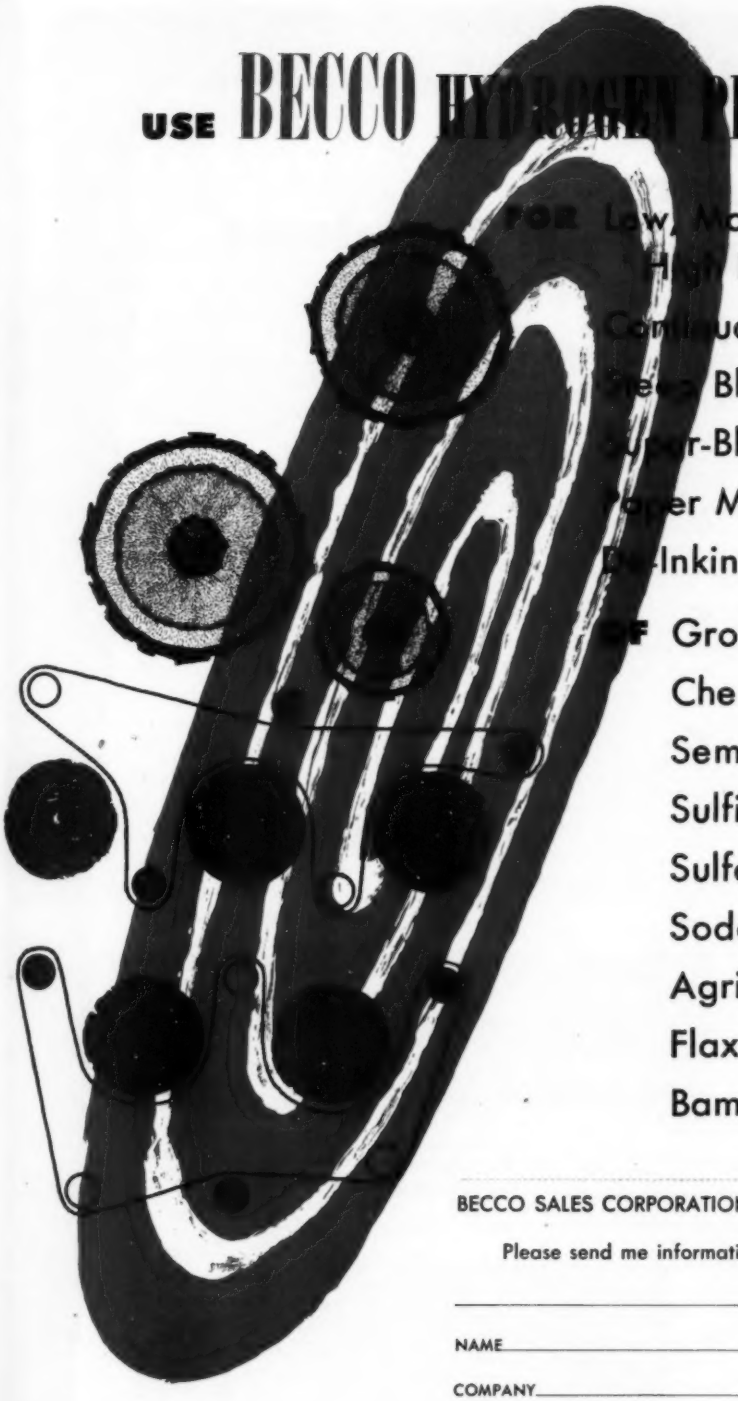

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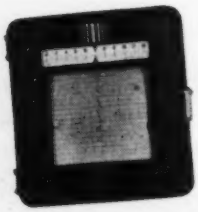
New Answers . . . to Present pH Problems

New Immersion Electrode Assembly uses no sampling line.

New lightweight Flow Electrode Assembly for sampling line measurements.



Two families of controllers for pH applications.

"Controllability Analysis" form for engineering data.

With brand-new developments in pH equipment, plus 26 years experience in pH instrumentation, L&N now has new answers to several important types of industrial pH problems. Furthermore, a unique, time-saving "Controllability Analysis" service quickly and accurately points to the control system which will solve the specific problem.

New developments in equipment cover both the electrodes which sense changes in the pH, and the housings or assemblies which hold the electrodes.

Entirely waterproof construction is featured in the new electrodes. It makes them ideal for humid or wet locations, since they are fully immune to electrical leakage as well as to penetration by process liquids.

One of the new assemblies is an immersion-type unit, to operate in tanks, reactors, etc.; it can even be totally submerged if necessary. It also operates in many places which formerly required a flow-type unit; in such cases it eliminates both the installation and the maintenance of sampling line, pump and accessories. It is made of light, corrosion-resistant plastic.

The other new electrode assembly features convenience and stability where a flow-type unit must be used. Made of plastic, it is light, small, easy to install and thoroughly dependable. Where plastic might not suit, we of course continue to supply assemblies of cast iron and/or Pyrex brand glass.

Two families of recording and controlling instruments are now available; the familiar, accurate and reliable Micromax and the newer but equally dependable Speedomax continuous-balance instrument. Both are available with either electrical or air actuated control systems.

For application engineering simply fill in one of our "Controllability Analysis" forms. Our engineers can then tell how closely pH can be held with either present or proposed plant layout. Let's get together on that pH problem! You will not be obligated; simply write to Leeds & Northrup Co., 4974 Stenton Avenue, Philadelphia 44, Pennsylvania.

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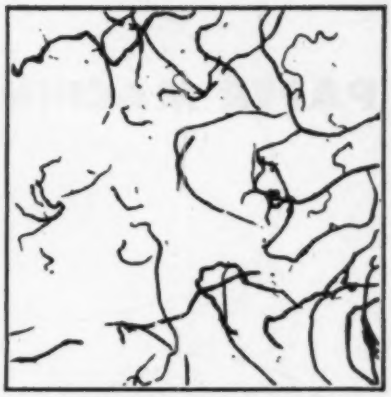
LOOK WHAT CURLATION CAN DO FOR *YOUR* PULP!

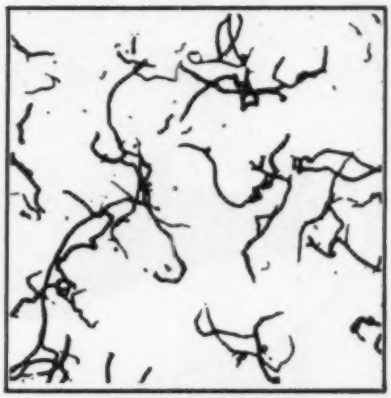
Uncurlated Bleached Southern Kraft



Curlated Bleached Southern Kraft

Photomicrographs of curlated and uncurlated pulp, showing how much curlation bends and twists fibers . . . changes fiber shape and diameter . . . yet, does not affect freeness. Any fiber bundles and dirt with the fibers are reduced by Curlator's patented rubbing and rolling process. *Note* in uncurlated photomicrographs how straight and coarse the fibers are . . . then see how curlation curls and thins fibers. That's why curlation makes a softer, more flexible, springier, smoother sheet.

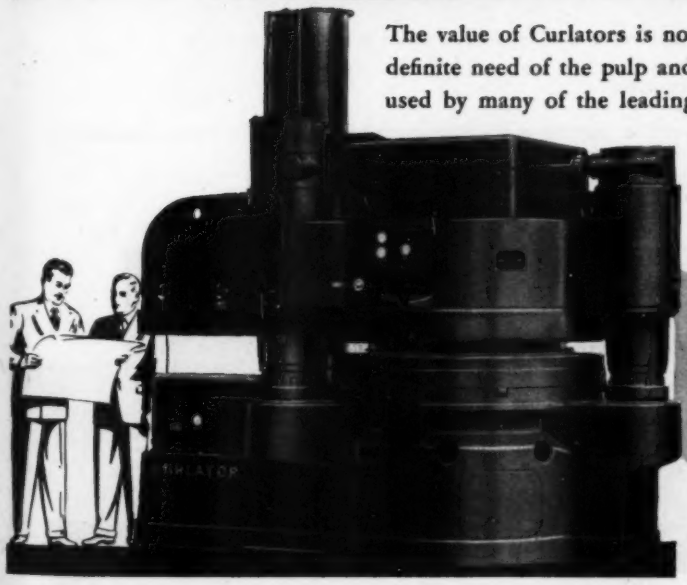
Uncurlated Bleached Sulphite



Curlated Bleached Sulphite

ONLY CURLATED PULP Gives You ALL These PLUS Qualities in Paper

✓ *Softer!* ✓ *Smoother!*
✓ *Stronger!* ✓ *Cleaner!*
✓ *More Flexible!*



The value of Curlators is now a matter of record. Developed to fill a definite need of the pulp and paper manufacturers, Curlators are now used by many of the leading paper companies. They are thoroughly engineered and precision built to give long and satisfactory service.

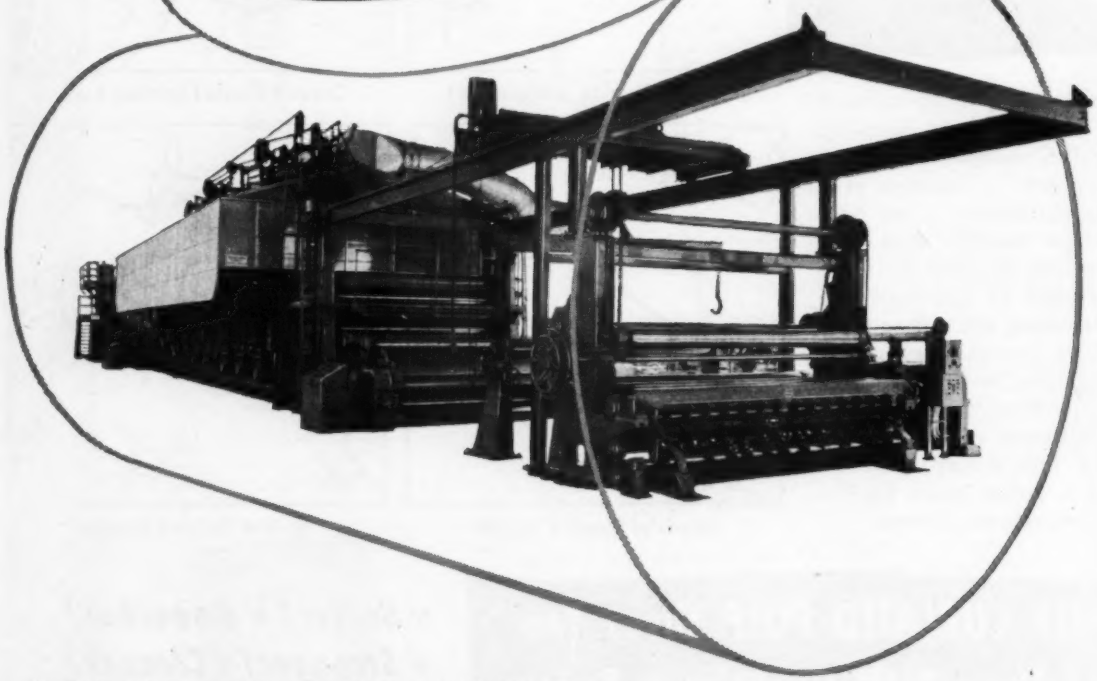
WRITE *today for more detailed information.*

CURLATOR† *Corporation*

565 BLOSSOM ROAD · ROCHESTER 10, NEW YORK

†T. M. Reg.—Curlator Corporation, Rochester, N. Y.

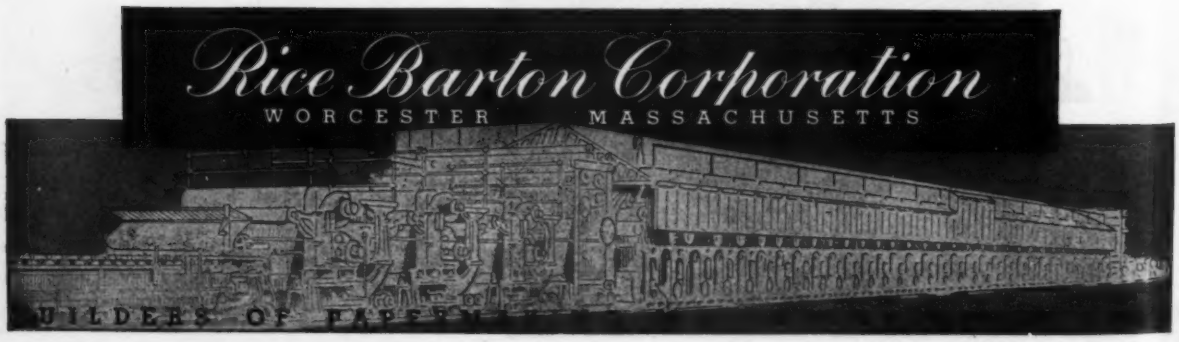
PAPER MACHINES *don't* COME IN CARTONS...



Each Rice Barton machine is engineered and built to do a specific job and to fit the requirements of space, location and production.

That's why Rice Barton machines have won so many friends in mills where costs, quantity and quality count.

Whether you make heavy board for cartons or the fussiest, thinnest paper for radio condensers, we would like to work out your problems with you. Please write:



Hooperwood Dryer Felts—cotton or asbestos—are engineered for the job they have to do. Whether the product is kraft, writing, newsprint, linerboard, book, or a specialty, there's a Hooperwood Dryer Felt made just for that job. Write WM. E. HOOPER & SONS COMPANY, Juniper and Cherry Streets, Philadelphia 7 • Mills: Woodberry, Baltimore 11.

.....and now they have more than 200 DIRTECS

Starting with a trial installation, one mill making printing and specialty papers now puts all of its stock through DIRTECS, better than 200 of them.

Why?

Dirtecs get the dirt out of the stock positively and continuously. The dirt is out for good — no chance for it to get back into the papermaking system.

Dirtecs are easy to install, operate and maintain.

Dirtecs are readily adaptable to all varieties of dirt conditions, stock conditions and volume conditions.

Dirtecs, like all other items of Bird Machinery, are built to help you make *better paper and more of it per day at lower cost per ton.*

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

The Paper Industry

July 1951

Sulphur supply looking up

Latest report on the sulphur situation indicates an end to the shortage by late next year. According to the June 30 *Chemical Week*, the current million-ton difference between world supply and demand ". . . will be erased by the 1.2 million long tons of costly new capacity which will be added to the industry's 1950 capacity of 11.7 million long tons." Some thirty projects in ten different countries are under way to produce sulphur from such sources as pyrites, hydrocarbon gases, smelter gases, and by the Frasch process.

According to this report about 40 per cent of the new capacity will utilize the Frasch process on the gulf coast of Texas and Louisiana. Another 20 per cent will come from natural gas and smelter gases. Expansion in pyrites burning will result from the installation of a number of Dorr Co.'s new "Fluosolids" pyrite burners. Surface deposits, being tapped in South America by use of Chemical Construction Corp.'s new process, may lead the way to wider utilization of surface sulphur in such places as Wyoming and other parts of the world.

Unquestionably sulphur is going to cost more in the future. In fact, the utilization of heretofore unpractical sources is only brought about by economic pressure resulting from differences in supply and demand.

Although the sulphur shortage is still with us, it has not been entirely without benefit. In its efforts to stretch the available supply the industry has come up with more efficient ways of utilization and recovery. In many cases it has been found possible to cut the use of sulphur in certain grades of sulphite pulp. In general the sulphite pulp producers have made appreciable advances in sulphur saving.

Prevent forest fires

Recent reports from the Pacific Northwest indicate the most critical fire season since 1922 in that area. While such conditions may not be as bad in other parts of the country, the forest fire season is here, and we, who are dependent on the wood-using industries, should make positive efforts to aid the campaign against fire carelessness.

In 1950, according to a recent report from the Forest Service, over 208 thousand fires burned some 15.5 million acres of forest land throughout the country. Breaking this down somewhat, we find that nearly 14 million acres of woodland were burned over in the 11 southern states lying south of Virginia. California alone lost nearly a half million acres. Most of the Rocky Mountain states showed an increase in forest acreage burned over 1949. Forest fire damage in the Midwest and Lake States area was less than usual but still amounted to over 600 thousand acres.

Destruction of timber resources isn't the only loss incurred when forests burn. As chief Forester Lyle F. Watts points out, there are many indirect but significant losses. Fires leave watersheds exposed, increase flood danger, create erosion problems, destroy wild life and ruin recreational areas.

One encouraging note is the Forest Service report that although recreational use of the national forests reached an all-time high last year, campers and smokers caused fewer forest fires in 1950 than they did in 1949. The decrease in forest fires started by this group indicates that the nationwide forest fire prevention campaign is gradually taking hold. Care and watchfulness on the part of each individual is a small price to pay to protect the basic raw materials for our industry.

BECKMAN—*the leading name in pH—presents another important advancement in instrumentation*

Announcing The BECKMAN MODEL N pH METER

Completely Portable!

Extremely Compact!

...and Really Rugged!

In the constantly expanding field of pH, there is wide demand for a *completely portable* battery-operated pH instrument that is low in price, light in weight, compact in size, and amply rugged to be used anywhere—in the orchard, in the oilfields, in textile mills, plating shops, mining and mill operations, food processing plants, laboratories... *anywhere*, without dependence upon outside power circuits.

The newly developed Beckman Model N pH Meter not only meets all these requirements, but also many more. Here are the highlights. Check them over. *Never before have unique advantages like these been combined into a single pH instrument!*

OPERATING SIMPLICITY AND ACCURACY...

- Accuracy to better than 0.05 pH.
- Low operating cost—less than 2c per hour.
- Built-in temperature compensation—0° to 100° C.
- Fast warm-up—less than 10 seconds.
- "Check Pointer" eliminates need for frequent buffer standardization.
- Batteries are easily checked with the regular panel controls—no need to disassemble the instrument. Clip-mounting of batteries eliminates need for soldering or wiring.

NEW COMPACTNESS AND RUGGEDNESS...

- All-metal case—cast aluminum with baked enamel finish to resist wear and corrosion.
- Splash-proof design—fully desiccated internally.
- Shock-proof—each tube is individually shock-mounted.
- Light weight—less than 8 lbs., complete.
- Small, compact—only 4" x 6" x 9½" overall.
- Equipped with the new Beckman Red Label Glass Electrode—virtually unbreakable, covers almost the entire pH range, usable from freezing to boiling.
- By far the most rugged overall construction of any pH meter.

GET ALL THE FACTS on this newest Beckman advancement in pH by contacting your nearest authorized Beckman instrument dealer. Or write direct!

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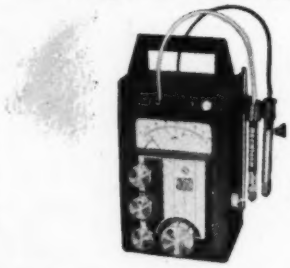
Beckman Instruments include: pH Meters and Electrodes — Spectrophotometers — Automatic Titrators — Radioactivity Meters — and Special Instruments

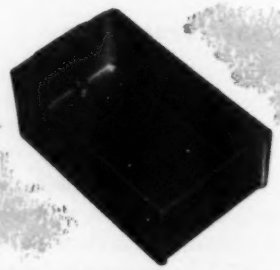
NEW **CONVENIENCE SIMPLICITY RUGGEDNESS**

make the Beckman Model N a noteworthy advancement. The following features are typical...



ELECTRODE SUPPORT ROTATES alongside case for maximum convenience in carrying. Instrument can be used in either horizontal position (shown at left) or vertical position (above)—whichever is handier.

CONVENIENT CONTROLS not only centralize all operating functions, but also permit checking amplifier circuits and battery condition without opening case or disturbing battery connections.



RUGGED, COMPACT DESIGN withstands rough field and plant service with negligible maintenance. Solid cast-aluminum case is strong, yet light in weight. Beckman Glass Electrode is virtually unbreakable!

There are many other important features designed into the Model N. Be sure to get the *complete* story on this new Beckman development!

The Paper Industry Current Comment

Pending:

Stricter controls... more authority... MORE TAXES!

Legislation trends indicated but outcome is unpredictable

THAT THE PRESIDENT will get the more stringent defense legislation which he demands is apparent, and the best that can be expected at this writing is that the present law will have been temporarily extended before it expires on June 30, and before this forecast appears in print.

The other big issue pending at Washington is the matter of increased taxes, and the Republican minority in the Ways and Means Committee has issued a blast against the Administration proposals.

The President's demands for "more stringent defense legislation" are so radical that even his friends in Congress are not believed to be sincere in their efforts to get his proposals enacted into law. All the demands for more stringent legislation come from the White House and the labor group which is practically out from under all controls, having won concessions which nullify efforts to control commodity prices.

Government seeks broad authority over business

One of the President's proposals is to allow the Government to build and operate manufacturing enterprises when private industry cannot consider the profit possibilities sufficient to justify expenditures. Another is to license all business, giving the President power to deny any concern the right to operate if his orders are not complied with. The opponents of further restrictive legislation argue that the present law is sufficient to meet the need, if properly utilized.

The House of Representatives Ways and Means Committee by a strict party line vote has recommended a tax increase of over seven billion dollars, and the Republican minority calls the proposals unbalanced, lopsided and economically unwise. The minority report accuses the Democrats of "scraping the bottom of the tax barrel, not for the purpose of halting inflation, but with a result of curtailing production and reducing savings, two of the most powerful weapons in our anti-inflationary arsenal."

The proposed bill would place a top limit of 90 per cent on income taxes, and a person whose income reached the figure to call for this tax would also be paying a New York State Income tax, for instance, of 7 per cent, or a total in direct income taxes of 97 per cent of his income.

The practical result is told in a New York story of a man with four jobs, paying $25,000 each, to fill. He went to men now receiving $10,000 a year with the offer of the new figure, for work in the same line of activity, and had no takers. The men approached said that the amount taken from them in increased taxes would leave too little take home pay to justify a change of employers.

Upset in Congress on newsprint situation

Meanwhile the people in Congress have "gone haywire" on the problem of newsprint. The subcommittee of the Senate Select Committee on Small Business proposes to ruin 95 per cent of the domestic paper industry to provide newspapers with the 5 per cent of output they now use. Here is a partial list of proposals for Government action: Subsidies to new producers, extending credit or underwriting loans for new newsprint mills, construction and operation by the Government of newsprint mills in Alaska and the making of Alaska timber available for private newsprint producers. To combat the newsprint shortage by pricing methods the group suggests prohibition of newsprint sale at more than a specified markup from mill cost, imposition of a tax on groundwood papers other than newsprint, imposition of a duty on imported newsprint. Then comes the most radical proposal of all, the removal of all duties on book paper, kraft paper and other non-newsprint papers to discourage their production in this country in preference to newsprint.

Price Stabilizer DiSalle has gone exactly nowhere in his effort to persuade Canada to assist in keeping down the price of newsprint. He has been told by Canadian officials that the recent price increases announced for the third quarter do not equalize the rise in the overall United States price index. Canada will not act to control newsprint prices. Mr. DiSalle now threatens to issue an order to fix the price at which consumers may buy newsprint.

The Forest Service is standing pat on its insistence that the vast areas of pulpwood timber in Alaska national forests be converted at least into pulp in the territory, and in no case shipped to existing mills outside the area. The Forest Service says that the timber available can supply at least five large pulp and paper mills. A Forest Service authority says that a $36,000,000 pulp mill will be started this year. Two others are said to be under discussion. Similar reports have been issued repeatedly for years.

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OFFERS THE COMPLETE LINE
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CORROSION RESISTANT
PIPING NEEDS
STAINLESS STEEL Conical End Fittings . . . Recessed End Fittings . . . "Zephyrweld" (Tube O.D. and Schedule V & X IPS Size) welding fittings . . . Stainless Steel Tubing and Pipe . . . Valves . . . Centrifugal Pumps . . . Pre-Fabricated Specialties . . . the complete line from one dependable source — TRI-CLOVER.
Install Tri-Clover's stainless steel or alloy products in your process lines and realize the advantages of increased production and lower maintenance cost. 32 years of specialized experience in solving corrosion piping problems can be yours by consulting our engineers.
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THE Complete LINE
FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

Govt. group meetings closed to leaders of industries

Meanwhile the hurly-burly of price and production controls continues. The Government has again taken the position that men of reputation in a given industry cannot be trusted to be truly patriotic in Government positions involving the use of their experience in the field with which they are conversant. Trade association executives are not permitted to attend meetings of Government groups considering problems of the industries with which they are often more informed than any single manufacturer.

Paper problems are constantly before Government agencies. Industry committees and task groups are constantly at work on the preparation of various formulas for pricing and production.

Back of the whole problem is the Admnistration theory that the way to combat inflation is to restrict profits. For the benefit of the rest of the world, international allocation of various grades of paper and pulp is under consideration. Meanwhile domestic output continues at a high ratio to capacity, and there is no apparent curtailment of consumption.

The National Production Authority has rejected the application of the Columbine development Co. for a $15,000,000 loan to build a pulp and paper mill in Canada. The authorization by the R.F.C. was originally for a newsprint mill, but Columbine changed its plans to enter the kraft field. The company has asked for a rehearing, charging favoritism.

NPA Classifies 558 Metals and Materials

Classification of 558 materials according to availability has been issued by the National Production Authority. This information, issued in leaflet form on June 20, is intended as a guide to Government and industry in substituting more plentiful materials for scarce ones.

Of the 558 materials, 151 were declared in "very short supply," 216 were in "tight supply," and 191 in "fair supply."

Financial

▶▶▶ PAPER MILL SECURITIES in general successfully resisted the bearish influences which affected stock markets during the month.

American Box Board Co.—Net income for six months ended May 31 was $937,313 as compared with $326,780 for the comparable period a year ago.

A.P.W. Products Co.—Net income for the first quarter was $76,902 as compared with $19,100 in the first quarter of 1950.

Celotex Corp.—Net income for the six months ended April 30 was $1,594,276 as

INDEPENDENT LAB TEST VERIFIES:

FULTON ROLL PRESS

DEWATERS BARK TO 54.30% MOISTURE

PITTSBURGH TESTING LABORATORY
PITTSBURGH, PA.

REPORT
of
Moisture Content of SMALL PIECES OF BARK
Submitted by

LABORATORY No. C 2701
FILE No.
Oct. 12, 1950

Fulton Iron Works Company
1259 Delaware Ave.
St. Louis, Missouri.

MOISTURE % 54.30

Respectfully submitted,
PITTSBURGH TESTING LABORATORY

NOW you can convert mill refuse into far more efficient fuel or by-product . . . in one continuous, low-cost operation!

This Pittsburgh Testing Laboratory report offers conclusive proof that the FULTON ROLL PRESS opens new profit possibilities never before available to the pulp and paper industry . . . because never before could you get a single unit that approached the FULTON ROLL PRESS in versatility and efficiency. This remarkable machine, perfected by the world's leading builder of cane milling equipment after 99 years of experience,

DEWATERS bark, mill refuse and MOST FIBROUS MATERIALS far more efficiently than conventional methods ...converts them from a liability to an asset *in seconds!*

REDUCES knots and screenings for redigestion or refining . . . eliminating much of today's waste.

99 YEARS YOUNG

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MAKERS OF FINE PROCESSING AND EXTRACTION EQUIPMENT SINCE 1852

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FAWICK
CLUTCHES INSURE
DEPENDABLE PERFORMANCE
IN PAPER MILL OPERATION

Gradual shock-free acceleration, constant running speed, and controlled deceleration of paper mills can be obtained with Fawick Clutch and Brake Units in the drive lines. Any degree of acceleration or deceleration may be obtained.

The simplicity of design in Fawick Clutches eliminates many hours of adjustment and maintenance time in this self-adjusting unit. This factor plus the exceptionally long life inherent in Fawick Clutches provides new standards of efficiency for paper mill operation.

FAWICK AIRFLEX CO., INC.
9919 CLINTON ROAD, CLEVELAND 11, OHIO

For specific information on all advantages of Fawick Industrial Clutch and Brake Units, write to the Main Office, Cleveland, O., for Bulletin 300.

FAWICK Airflex
INDUSTRIAL CLUTCHES AND BRAKES

compared with $680,874 for the comparable period a year ago.

Gaylord Container Corp.—Net income for the first quarter was $2,369,060 as compared with $954,163 a year ago.

Kimberly-Clark Corp.—Net profit for the fiscal year ended April 30 was $11,620,743 as compared with $9,855,910 for the previous year.

Marathon Corp.—Net income for six months ended April 30 was $3,800,957 as compared with $2,678,641 a year ago.

Missiquoi Corp.—Net income in 1950 was $396,131 as compared with $244,445 in 1949.

National Container Corp.—Net income for the first quarter was $513,334 as against $323,444 a year ago.

Paper Mill Corporate Changes

Oswego Falls Corp.

Common stockholders have been given warrants as rights to subscribe for 96,000 shares of Series A, 5 per cent convertible second preferred stock at the rate of one share for each five shares of common. The subscription price is 31¼, the proceeds to be used as added working capital and for the payment of $1,250,000 in short term bank loans.

Lily-Tulip Cup Corp.

SEC informed of plans to raise about $11,000,000 for plant expansion and other corporate purposes. Of this, $7,000,000 will come through sale of 3¾% 20-year sinking fund notes to several insurance companies and the other $4,000,000 through sale to stockholders of 75,000 additional common shares in the ratio of 1 for 5. The offering price and the record date for the stock subscription will be supplied by amendment. Blyth and Co., Inc., and associates are to act as underwriters. The company will use $3,000,000 of the money from the debentures and stock to redeem its 4.5% cumulative preferred stock and $2,000,000 for retirement of bank notes.

Sutherland Paper Co.

A more flexible capital structure and additional working capital has been effected by a four-step plan just announced by the Sutherland Paper Co., Kalamazoo, Mich.

First—The stockholders approved an amendment of the company's articles of incorporation, increasing the authorized common stock from 486,000 shares of $10 par value to 2,000,000 shares of $5 par. At the same time, a two-for-one share distribution affecting the outstanding stock was authorized. Following this action, the board declared a regularly quarterly dividend of 37.5 cents per share of common stock instead of the customary 50 cents per share. It also announced an extra dividend of 2.5 cents per share. These distributions are payable September 15 to stockholders of record Aug. 17.

Second—The company authorized redemption of all the 34,400 shares of 4½ per cent cumulative convertible preferred stock. This left the company without any outstanding preferred stock.

Third—This step in the program was sale of $5,500,000 worth of 3½ per cent notes of the company to three institutional

CHEMICAL USERS' GUIDE To General Chemical Products for the Paper Industry

PRODUCT	AVAILABLE FORMS	COMMERCIAL STRENGTH (MIN.)	SHIPPING CONTAINERS	APPLICATIONS
Aluminum Sulfate $Al_2(SO_4)_3 \cdot 14H_2O$ approx. *(Alum)*	Commercial & Iron Free: Lump, Ground Powdered	17.25% Al_2O_3	Bags Bulk Carloads	Precipitation of rosin size and filler; water clarification; manufacture of satin white; pitch control; mordant for dyes.
Aluminum Sulfate $Al_2(SO_4)_3$ + water *(Liquid Alum)*	Liquid	32° Be (total Al_2O_3 7.2%)	Tank Trucks Tank Cars	Same as commercial dry product but lower strength.
Salt Cake Na_2SO_4 *(Sodium Sulfate)*	White or Grayish Granules	95-99% Na_2SO_4	Bags Bulk Carloads	Used in kraft cooking liquors as the source of Na_2S.
Glauber's Salt, Crystal $Na_2SO_4 \cdot 10H_2O$ *(Sodium Sulfate)*	Colorless Crystals	96% $Na_2SO_4 \cdot 10H_2O$ (42.3% Na_2SO_4)	Bags Barrels Fibre Drums	Substitute for salt cake in kraft cooking liquor.
Glauber's Salt, Anhydrous Na_2SO_4 *(Sodium Sulfate)*	White Granules	99.5% Na_2SO_4	Bags Bulk Carloads	Same as Crystal but stronger product.
Sulfuric Acid H_2SO_4	Liquid	66° (93.19%), 99% 20% oleum and higher strengths	Carboys Steel Drums Tank Trucks Tank Cars	Wire souring; parchmentizing; acid wash in last stage of multi-stage pulp bleaching; neutralizing tall oil soaps.
Sodium Thiosulfate $Na_2S_2O_3 \cdot 5H_2O$ *(Hypo)*	Colorless Crystals	99.75% $Na_2S_2O_3 \cdot 5H_2O$	Bags Fibre Drums	Anti-chlor.
Sodium Sulfite, Anhydrous Na_2SO_3 *("Sulfite")*	White Powder	98.5% Na_2SO_3	Bags Fibre Drums	Anti-chlor.
Sodium Silicate $Na_2O \cdot XSO_2$ + water *(Water Glass)*	Liquid	38°, 41°, 42° Be; special and higher strengths	Steel Drums Tank Cars Tank Trucks	Adhesive for corrugated and solid fibre board; used in coating mixtures to reduce viscosity and in beater sizing to stiffen paper. Aid in bleaching & flocculation.
Chromium Potassium Sulfate $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$ *(Potash Chrome Alum)*	Red Violet Crystals	99.5% $K_2SO_4 \cdot Cr_2(SO_4)_3$ $24H_2O$	Fibre Drums	Used in "save-all" or white water systems.
Aqua Ammonia NH_4OH + water *(Ammonia)*	Colorless Liquid	26° Be (29.4% NH_3)	Carboys Steel Drums Tank Trucks	Used with chlorine to form chloramines for slime control.
Sodium Fluoride	Powder	90% NaF 95% NaF	Fibre Drums	Preservative and stabilizer for starch in coating mixtures.
Tetrasodium Pyrophosphate, Anhydrous $Na_4P_2O_7$ *(TSPP) (Pyro)*	White Powder	98% $Na_4P_2O_7$ (Equiv. 52% P_2O_5)	Bags Fibre Drums	Felt washing; pitch dispersion.
Nitric Acid HNO_3 + water	Liquid	42° Be 67.2% HNO_3	Carboys Drums Tank Trucks	Nitrating pulp; cleaning monel metal.
Sodium Sulfide Na_2S + water	Red Chips or Solid Mass	60% Na_2S	Steel Drums	Substitute for salt cake in modified soda process.

BASIC CHEMICALS

FOR AMERICAN INDUSTRY

The products advertised are commercial chemicals having various uses, some of which may be covered by patents, and the user must accept full responsibility for compliance therewith.

OTHER PRODUCTS: Hydrochloric Acid; Sodium Metasilicate; Trisodium Phosphate; Copper Sulphate; Disodium Phosphate.

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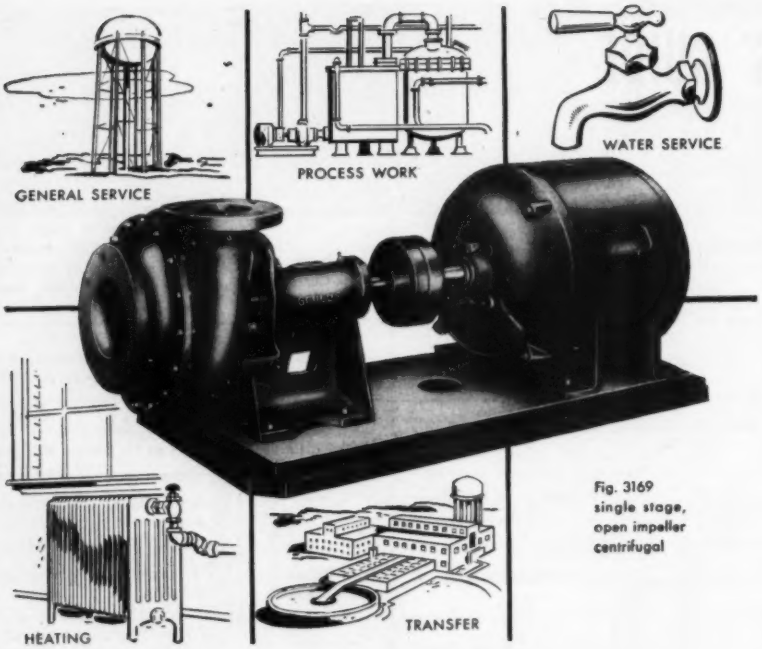


Fig. 3169 single stage, open impeller centrifugal

Highly Adaptable . . . Exceptionally Efficient

NEW GOULDS PUMP

Designed for Long Service

Here's a new Goulds pump, built to do many different jobs. Especially designed for general water service, process work, slurries, circulation, transfer, and factory wastes, the remarkably versatile 3169 also handles air conditioning, plumbing, heating, and many others.

DEPENDABLE, ECONOMICAL OPERATION **Its modern hydraulic design provides exceptionally high operating efficiency with low power consumption. Ruggedly constructed, yet light and compact, this pump will give you trouble-free service over the long pull.**

AVAILABLE IN TEN SIZES **Available in ten sizes for both motor and belt drives, the 3169 has capacities up to 1080 G.P.M.—with heads to 290 ft.**

For complete information phone or write Pump Headquarters, Seneca Falls, N. Y. Ask for Bulletin 720.4.

MEMBER

Goulds PUMPS INC. Seneca Falls New York

investors. Proceeds are being used to retire existing outstanding funded debt in the amount of $3,100,000 and to increase the working capital.

Fourth — Final step was offering to the company's holders of outstanding common stock of record at 3 p.m. June 18, the right to purchase at $100 per share, 34,399 shares of 4.40 per cent cumulative preferred stock, convertible on or before June 15, 1961, into common stock at $28.57 per share, or at the rate of 3½ shares of common stock for each share of preferred.

Commencing in 1962 the preferred stock will be entitled to the benefit of an annual sinking fund sufficient to redeem two per cent of the number of shares of preferred stock outstanding June 16, 1961. Net proceeds from the sale of preferred stock, amounting to approximately $3,350,000, will be added to the company's working capital.

Board Chairman L. W. Sutherland, and President William Race who made this announcement stated that "during the past month the company has effected the conversion of the old preferred stock, split the common stock two-for-one, placed privately $5,500,000 of 20-year, 3½ per cent notes, and retired all the previously outstanding funded debt.

"This completes the financing program designed to provide the company with (1) a flexible capital structure consistent with the needs of a growing company in an expanding industry, (2) with additional funds required as a result of the substantial growth of sales during the last 18 months and the increase in the cost of doing business."

New York Stock Exchange—Stocks
(Closing Prices)

	June 20, 1951	May 21, 1951
A.P.W. Products	7¼	6⅝
Celotex	16¼	16⅛
Same Preferred	16⅞	17
Certain-teed Products	15	15⅞
Champion P. & F. Co.	54⅜	54¼
Same Preferred	*102½–103	102½
Chesapeake Corp.	33	* 31–32¼
Continental Diamond	14⅛	13⅞
Container Corp.	37½	35¼
Same Preferred	*102½–103	*100½–101
Crown Zellerbach	52⅞	52¼
Same Preferred	102½	102½
Dixie Vortex	59½	61
Same "A"	* 58¼–59½	* 61–63
Eastern Corp.	21⅛	20
Robert Gair	13⅛	13¼
Same Preferred	19	* 19⅛–19⅝
Gaylord Container	27	27
International Paper	50⅛	50
Same Preferred	*101½–102½	103¼
Kimberly-Clark	46	45
McAndrews & Forbes	* 39¼–40	* 37½–38½
Marathon	48	* 46–46¾
Masonite	32	33
Mead Corp.	25¼	25⅜
Same Preferred	90¼	89
Same 2nd Preferred	* 61–66	* 58–64
National Container	13⅛	13⅛
Rayonier, Inc.	53⅜	47⅞
Same Preferred	* 35⅜–36	36⅝
Scott Paper	50¼	48
Same $3.40 Preferred	90	91⅝
Same $4.00 Preferred	*106–107¼	*105–107
St. Regis	14⅛	13⅝
Same Preferred	90	90½
Sutherland Paper (new)	23	51¼
Same Preferred (new)	106¾	128¾
Union Bag & Paper Co.	45⅝	43¼
United Board & Carton	* 17⅜–18½	* 18¼–19
United Wall Paper	* 3⅜–3½	3⅝
Same Preferred	* 27–27¼	* 25¾–27¼
U. S. Gypsum	107	107½
Same Preferred	*172½–177	*175–178
West Va. P. & P. Co.	* 82½–84½	81¾
Same Preferred	*106½–108	107

New York Stock Exchange—Bonds

	June 20, 1951	May 21, 1951
A.P.W. Products	91½	90
Celotex 3¼%	101	101
Champion P. & F. Co. 3%	101½	101½
Mead Corp. 3%	100	104

New York Curb Exchange—Stocks

Am. Writing	10½	10½
Great Northern	51⅛	52
Hammermill	41	.....

*Closing Bid and Asked Prices.

RAISIN CASE

*At River Raisin self-liquidating** **Cyclator®**

Pays for itself with recovered fiber, including operating, maintenance and depreciation costs.

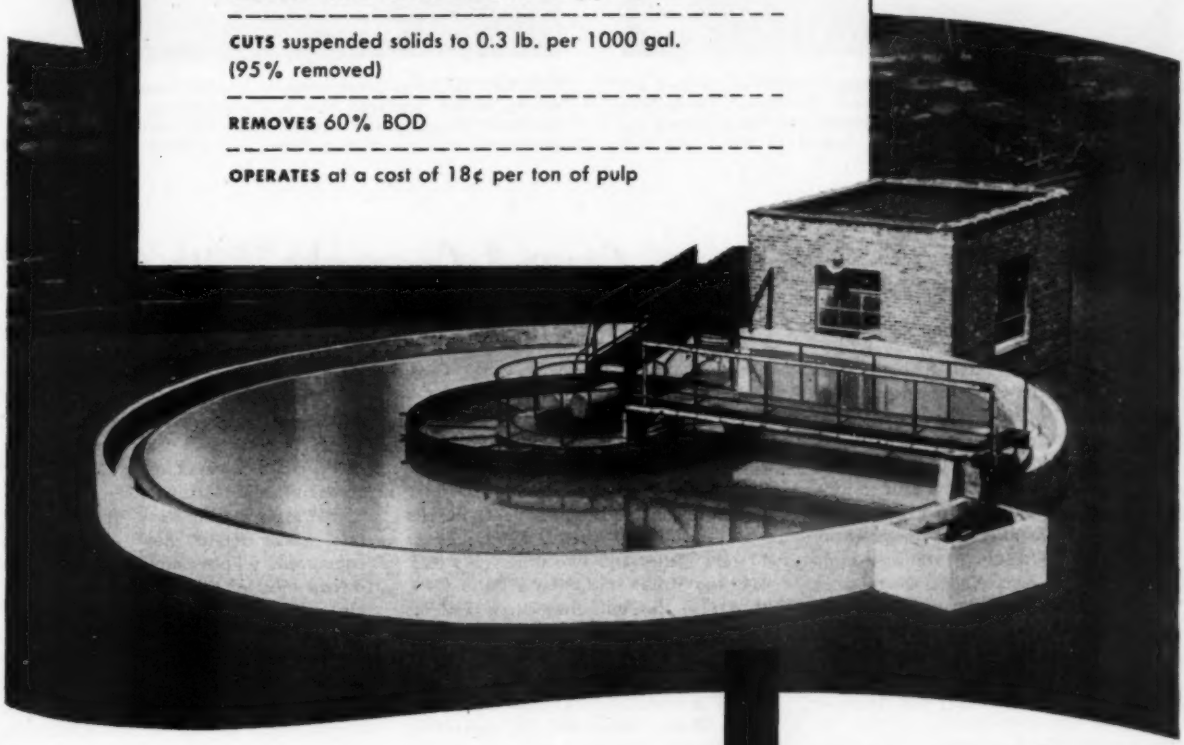
HOLDS fiber loss to 1/10%

REDUCES waste volume 68% (3400 g.p.m.)

CUTS suspended solids to 0.3 lb. per 1000 gal. (95% removed)

REMOVES 60% BOD

OPERATES at a cost of 18¢ per ton of pulp



The Cyclator at River Raisin Paper Company's Monroe, Michigan, plant combines chemical *and* mechanical methods *plus* slurry recirculation all in one unit to handle voluminous sludge from a 200-ton liner board mill. Eliminates costly mixing, coagulating and settling basins. Saves valuable space.

Cuts pollution. Improves public relations.

they bought another Cyclator

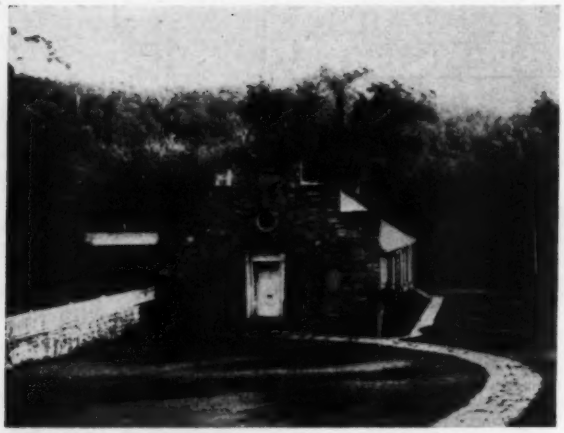
Results were so satisfactory with the Infilco equipment described above—the customer recently ordered another complete new installation, doubling waste-treatment capacity.

INFILCO
• BETTER WATER CONDITIONING • AND WASTE TREATMENT SINCE 1894

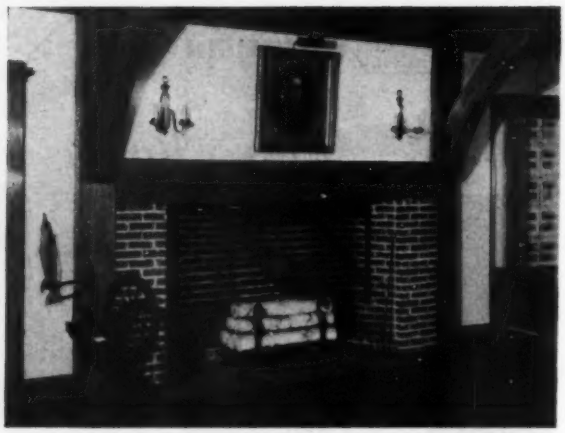
INFILCO INCORPORATED | *Tucson, Arizona*

FIELD ENGINEERING OFFICES IN 26 PRINCIPAL CITIES

World's Leading Manufacturers of Water Conditioning and Waste-Treating Equipment



CRANE MUSEUM, opened in 1930, houses exhibits of company and papermaking progress during the past 150 years. This building originally was the rag room of the old Stone Mill, which burned and was replaced by the Pioneer Mill, largest of the Crane mills



PORTRAIT OF Zenas Crane, company founder, hangs in the Museum. Among exhibits displayed here is a scale model of the vat used by Zenas Crane in the original mill. This miniature mold was constructed by Dard Hunter, noted papermaking history authority

Crane & Co. marks 150th year . . .

▶▶▶ PAPER FOR CURRENCY was first made for the Government by Crane & Company in 1879. This is the 73rd consecutive year Crane has been awarded a contract for currency paper.

In this year of 1951, Crane & Co. celebrates its 150th anniversary. It is still actively managed by members of the same family; there are now eight descendants of Zenas Crane, the founder, representing the fourth and fifth generations of papermakers working in Dalton. One out of every five employees of the present organization has worked at Crane & Co. for twenty-five years or more.

Crane & Co. has adhered strictly to the principles on which it was founded—it is traditionally recognized as a manufacturer of the finest papers turned out by any company, and no other company has been able to take from it the Government order for currency paper.

The Crane family came to the United States from England in 1648 (or 1649) and settled in Milton (Berkshire County), Mass. Eighty years later, the first paper mill in the state of Massachusetts was established there. Later, Zenas Crane's father and two other men took over the Milton mill from 1770 to 1793. It was in this mill that Zenas and his brother, Stephen, had their introduction to papermaking.

Stephen, the elder brother, later established a small mill at Newton Lower Falls. Zenas completed his apprenticeship under Stephen, and in 1799 he traveled through the Berkshires looking for a mill site. He was then only 22 years of age.

When young Zenas rode into the community of Dalton, he envisioned a paper mill that would be served by the Housatonic—a swift flowing stream that would provide pure water necessary to make fine rag paper, as well as power to operate the machinery.

It is a fascinating story, that historical tale which relates how Zenas Crane convinced a prosperous farmer who owned most of the land along the river that here a paper mill should be built. The first problem solved, he then found partners who provided a small amount of capital to cover cost of the building with a little left over for working capital.

The early history of the little company, which in those days met with nominal success, oddly enough reads like something from the front page of today's newspapers. There was the problem of competition, a demand for

PIONEER MILL stands on site of original mill and its successor, the Stone Mill. Paper for American Bank Note Co. is made here

OLD BERKSHIRE MILL where thin paper experiments have been carried on. Special papers for Bible printing are made here

"FOOLSCAP" originated on ancient watermark depicting a fool's cap. This label, used by Zenas Crane & Sons before 1840, shows a picture of the original mill

CURRENCY PAPER and U. S. Government bond paper are made exclusively in this Crane & Co. mill at Dalton. It has always been known as the "Government Mill." Zenas Marshall Crane introduced the tiny red and blue silk threads into the paper mix in 1846 as a protection against counterfeiting

and receives 73rd contract for currency paper

cheaper, lower priced paper. But the company remained resolute and continued to put out only fine rag papers. However, progress would not be denied, and came the new era in papermaking —the machine age, and the introduction of groundwood pulp. Crane continued to make paper from rags and to turn out more specialties of fine quality.

The mill in Dalton, which started as a one-vat mill with Zenas Crane doubling as general manager, one-man office, superintendent and salesman, formed the beginning of a company which now operates four mills—including the Government mill—all making fine rag papers.

Memorial Museum

Close by the Pioneer Mill, largest of the Crane mills, stands a quaint stone building. This landmark originally was the rag room of the Old Stone Mill, built in 1844. The Pioneer Mill, rebuilt when the Old Stone Mill was burned, now makes paper for the American Bank Note Co. But the old rag room which remained, was opened as a museum in 1930. Here the visitor may trace the history of the company, as well as the progress of papermaking in this country during the past 150 years. There are a scale model of the vat house of the original Crane mill, and one of the hand moulds used by Zenas Crane. Samples of distinctive papers are on display including paper for currency, bonds, stock certificates, and other fine documents.

With the present personnel of Crane & Co. management boasting eight descendants of the founder, it is only logical to assume that family descendants will remain in the company through several generations to come. Six Cranes now associated with the company are:

Eight Descendants

Winthrop M. Crane, Jr., president since 1923. In 1904, he started to work in the mills in overalls at $15 per week.

Bruce Crane, vice president, has served the company since 1932.

Arthur E. Crane and *Winthrop M. Crane III*, both started with the company about 1932.

Frederick G. Crane and *Zenas Crane Colt* serve on the board of directors; they do not at present have any operating responsibility, but maintain offices in the administration building.

In addition, two other descendants of Zenas Crane are associated with the company.

BAY STATE MILL where fine papers for social stationery are manufactured. Paper was made here to meet European competition

STATIONERY DIVISION where fine Crane papers are converted into social stationery by highly skilled hands and special machines

Four Canadian Newsprint Manufacturers Up Price $10

▶▶▶ THE PRICE BOOST on newsprint—first announced by two Canadian mills on June 1—remains headline news; two more mills have increased prices since that first announcement, and accusations and replies thereto have been flung back and forth between Washington and Ottawa.

The $10 per ton increase in newsprint prices which became effective on July 1 benefits the following large Canadian newsprint manufacturers:

Abitibi Power and Paper Co., Ltd.
Powell River Co., Ltd.
Anglo-Canadian Pulp & Paper Mills, Ltd.
Mersey Paper Co., Ltd.

A stormy reaction by U.S. Price Stabilizer Michael V. DiSalle has not changed the situation in any way. There was, it seems, a sort of an agreement between DiSalle and R. M. Fowler, director of the Pulp and Paper Division of Canada's Dept. of Defense Production that DiSalle would be given due notice should any such situation arise.

DiSalle resists increase

DiSalle wrote Mr. Fowler referring to their understanding on this point. Mr. Fowler's rather lengthy reply under date of June 12 has been widely republished —he considers the length of time between the announcement and July 1 when the increase became effective sufficient to study the situation before any increases were put into effect.

PA DiSalle went to work to study the possibility of placing a ceiling on the price of newsprint imports as a means of voiding the Canadian boost. However, so far no legal means have been found whereby ceilings could be imposed on imports.

And so, the price of Canadian newsprint is now $116 a ton, U.S. currency. From 70 to 85 per cent of the newsprint used in the U.S. is imported from Canada, and, of course, is not subject to American price controls. The prices of the U.S. manufacturers supplying the other 15 to 20 per cent of the newsprint used in this country have been frozen since the general price freeze of January 26. Then, too, U.S. manufacturers are governed by ceiling price regulation No. 22, effective May 28, which order allows for increased costs of materials and labor over a pre-Korean base in computing prices. Such applications must pass approval of the OPS.

Canada's Production Minister Howe stated that under the circumstances he could raise no objection to the increase. The newsprint price increase was the second in two years, but previously there had been no increase for a period of 2½ years. Last year the price was stepped up only $6 per ton.

Prior to the announcement of the Canadian price increase, the Department of Defense Production at Ottawa reported Canada's production of newsprint this year is estimated at 5,450,000 tons—an increase of 171,000 tons, or 3.2 per cent over 1950.

PM Howe defends action

Concurrent to his announcement that he could not set aside the increase, Production Minister Howe made the following statements:

1— Canada will supply France with 2500 tons of a 3000-ton emergency allocation recommended by an international conference of scarce materials.

2— Newsprint consumption by Canadian publishers was increasing and there was doubt whether producers would be able to supply domestic demands beyond the record 355,000 tons distributed in Canada last year.

3— North American users of Canadian newsprint may get slightly less newsprint as a result of the allocations to France and other recommendations that may be recommended by the International Materials Conference.

PM Howe further stated that "If the price (of newsprint) had been allowed to increase in accordance with other wood products in the U.S., newsprint now would be selling for $143 per ton in the United States." . . . "today in the U.S. market, the pulp content of a ton of finished newsprint will bring more money than a ton of finished newsprint with the expense of finishing and packaging."

Sulphur Control Order Issued by NPA

New controls on the distribution and use of sulphur were issued by the National Production Authority on June 1 under Order M-69.

Under this order, consumers of sulphur are restricted to 100 per cent of their average monthly consumption for 1950, with seasonal adjustments. Mills using more than 20 tons of sulphur monthly are required to file reports with the NPA by the 28th of each month, giving data on the previous month's consumption, inventories at the end of the previous month, estimated consumption of the current month, and estimated inventories at the end of the current month.

Producers of sulphur are required, under this order, to submit to NPA quarterly lists of proposed shipments.

The first monthly report to be filed on NPAF-98 was due on June 28. Forms are available from the local offices of the Department of Commerce.

CANADIAN INDUSTRY will spend $11,000,000 in capital investment this year to increase Canadian sulphur production, with production to start in 1952, according to J. R. Donald, chemicals director in the Defense Production Department, Ottawa, Ontario.

OPS Issues Price Fixing Order on Pulp

A price fixing order was announced on June 20 by the Office of Price Stabilization to cover twelve standard grades of domestic pulp and four grades of overseas pulp, which will mean a rollback on domestic prices for some grades and a permissive price for foreign pulp of $85 per ton above the ceiling for domestic output.

The new ceilings for air-dried pulp, measured in short tons, are as follows:

	Domestic	*Overseas*
Bleached sulphite	$140.00	$225.00
Unbleached sulphite	132.50	200.00
Bleached sulphate	145.00	230.00
Semibleached sulphate	140.00	.....
Unbleached sulphate	132.50	225.00
Bleached soda pulp	140.00	.....
Groundwood pulp	92.50	.....
Sulphite screenings	72.50	.....
Sulphate screenings	67.50	.....
Groundwood screenings	60.00	.....
Unbleached sulphate side-runs	132.50	.....
Standard newsprint side-runs	92.50	.....

Canada has agreed to hold its prices at present levels, with no increase to be allowed without consultation with the United States.

Domestic producers are required to absorb freight charges in part, a scale of percentages being provided for the four principal producing areas, the ceiling price being that for delivery at the customer's mill.

The ceiling prices for imported pulp are fob Atlantic coast dock.

Ceiling prices for special grades are to be computed by the producers on a basis comparable with those for closely resembling grades.

The new ceilings will be effective on June 30.

Paper Industry Committee Organized to Work with Quartermaster Corps

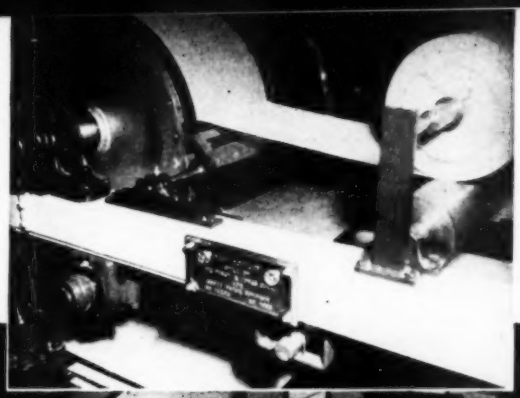
Tentative organization of a paper industry committee to co-operate with the Quartermaster Corps, U.S. Army, was effected at a New York meeting on June 5.

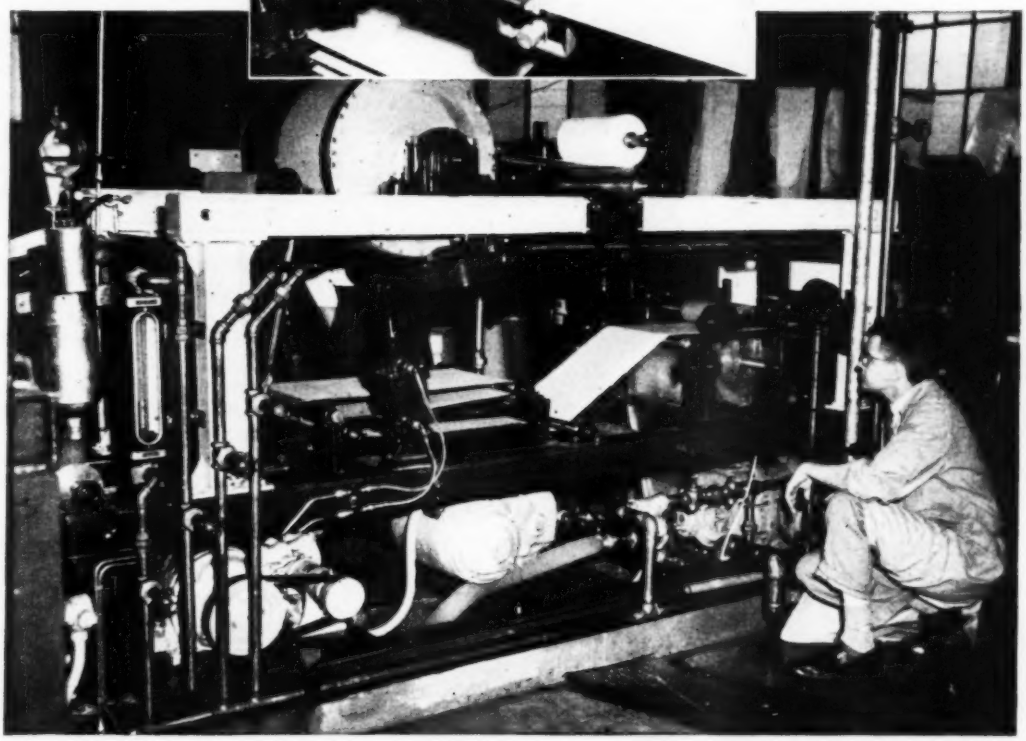
The purpose of the new group is to co-operate with the Army's procurement establishment in a program for industrial preparedness. Industry representatives came from the kraft, book, writing, and waterproof paper branches, and were given the Army picture of procure-

Below, 10-inch Pusey-

Below, 10-inch Puseyjones Cylinder Tissue Machine. For tissue with a basis weight of 8#/2880 Sq. Ft., and toweling with a basis weight of 35#/2880 Sq. Ft. Speeds range from 5 to 20 feet per minute.

At right, close-up showing creping arrangement and wind-up.





Forms toweling and tissue continuously—*in the Laboratory*

A new experimental machine built by Puseyjones for Scott Paper Company, Chester, Pa., world's largest manufacturers of toilet tissues and paper towels, offers these important advantages over forming samples by hand:

(1) Permits continuous addition of chemicals
(2) Permits continuous change of the proportion of chemicals
(3) Assures close correlation of end sheet results with the production of regular machines
(4) Minimizes experimental production losses on commercial machines

To permit observation of internal flow and formation conditions, Puseyjones built the Cylinder Vat and Flow Spreader of Plexiglas. The single creping drier is electrically heated, using the radiant heating principle.

Research or production . . . Fourdrinier, Cylinder Machine, Yankee or a combination . . . whatever your papermaking problem may be, the experience and facilities of the Puseyjones organization are yours to command. Write us today.

THE PUSEY AND JONES CORPORATION

Est. 1848 — Builders of Paper-Making Machinery
Fabricators & Welders of all classes of Steel & Alloy Products
Wilmington 99, Delaware, U. S. A.

ment methods by officers of the Quartermaster Corps. The agency with which industry was asked to co-operate buys paper items for the Army, Navy, and Air Force, as a consolidated purchasing organization for the Armed Forces.

More new mills announced

Scott Paper Co. to share in Texas project

Certificate application has been filed with the DPA for a $30,000,000 paper mill to be built near Evadale, in the piney woods of Southeast Texas.

If authority is granted, the plant will be built and operated jointly by the Houston Oil Co. and Scott Paper Co., Chester, Pa. It is stated that ample wood supply in the area is available for such a plant.

Mead Corp. to build board mill near Rome (Ga.)

Certificate of necessity has been granted The Mead Corp., Dayton, Ohio, to build a $21,000,000 kraft container board mill on the Coosa River, about 10 miles from Rome, Ga. Site of the proposed mill is a 700-acre tract.

A. H. Mahrt, Mead vice president, said the new plant will provide a ready market for pulpwood, and he added that the company also plans an extensive forestry program on a 40,000-acre tract near the Allatoona Dam hydroelectric and flood control project about 40 miles east of Rome. Mr. Mahrt also stated that the new plant will be a duplicate of the company's Macon (Ga.) operation. Present plans call for a mill to produce about 600 tons of kraft liner board per day.

Knight Newspapers buys St. Lawrence Paper Corp.

Purchase of the St. Lawrence Paper Corp.'s newsprint mill at Norfolk, N.Y., has been announced by Knight Newspapers, Inc. Price involved was approximately $2,500,000. Knight newspapers include the *Chicago Daily News;* Akron, Ohio, *Beacon Journal:* Miami, Florida, *Herald,* and Detroit, Mich. *Free Press.*

The mill, formerly owned by St. Regis, was sold about a year ago to a group headed by Harry Pearlman.

Pulp mill planned near Edmonton

An agreement has been signed by the North West Pulp & Power Ltd. and the Alberta Government for the construction of a pulp mill at Yates, five miles east of Edson and 123 miles west of Edmonton, near the McLeod River crossing.

According to the agreement, the company must begin plant contsruction by May 1, 1952, with a minimum capacity of 200 tons of pulp per day. Plant and equipment must be in operation by May 1, 1954.

The agreement also provides that the plant shall be extended to manufacture chemical or semichemical pulp, or both, and paper. Expansion for this purpose is to commence by May 1, 1959, and shall be completed and equipment installed by May 1, 1961.

C-W files application for permit to build new mill in San Leandro

Application has been filed by Crown Willamette Div. of Crown Zellerbach Corp. for a new paper mill to be built in San Leandro, Calif., next to the Western Waxed Paper Co., another C-Z subsidiary.

According to R. A. McDonald, executive vice president, the cost of the building and equipment will approximate $3,000,000. A 44-acre site for the purpose has been purchased from the Southern Pacific Railroad Co.

Expansion program under way at Halifax Paper Co.

Expansion program planned earlier this year (Cf. P.I. Feb.) has been started at Halifax Paper Co., Roanoke Rapids, N. C., a subsidiary of Albermarle Paper Co., Richmond, Va. The cost is estimated at $5,800,000.

Rust engineering has been awarded contract for a building 620 ft. by 76 ft. to house a new kraft paper machine. Completion of the work is planned for August, 1952, and it is expected that the daily production of the plant will be increased by 200 tons of paper. At present, the mill has a daily rated capacity of 75 tons of kraft paper or board and 250 tons of pulp.

MORE FLOOR SPACE will be provided at the plant of Champion Paper and Fibre Co., Hamilton, Ohio, upon completion of a new building addition now under way. The new construction is on the site of an adjacent parking lot. To provide parking accommodations, a residential area nearby will be vacated.

CONSTRUCTION OF A PAPER MILL being built at Pryor, Okla., for National Gypsum Co., (Cf. P. I., January, 1951) should be completed by the end of this year. The new mill will satisfy paper requirements for all National Gypsum plants. Shortages of paper and shipping containers have recently affected the firm's production costs since part of needed paper must be taken from the open market; this shortage may soon curtail production of several National Gypsum plants.

THE GROUND FLOOR of a building at 139 Main Street, Lodi, N.J., has been leased by Clayton Container Co. The new space will give the Clayton firm some 10,000 additional square feet of work area.

CONTRACT FOR additions to two of its Florida mills has been placed by St. Regis Paper Co. An office building will be constructed at the Pensacola plant, and an administration building at Jacksonville will cost approximately $1,000,000.

PLANS AND SPECIFICATIONS for an addition to the finishing room of the Brightwater Paper Co., Adams, Mass., have been prepared by Charles T. Main, Inc., Boston consulting engineers. The addition as planned will be 200 feet long and 50 feet wide.

Schorsch Plants Bought by Equitable Bag Co.

Machinery and equipment of Schorsch & Co., Inc. (paper bag manufacturers), Bronx, N. Y., have been acquired by Equitable Paper Bag Co., Inc., Long Island City, N. Y. Some of the machines from the Schorsch plant will be used to expand the Equitable operation in its Long Island City and Orange (Texas) plants. Some machines and auxiliary equipment will be offered to other domestic and foreign paper bag companies.

The Schorsch company retired from business recently after celebrating its 50th anniversary.

National Container Buys Control of Jaite

Approximately 97 per cent of the outstanding stock of the Jaite Co., of Jaite, Ohio, has been acquired by National Container Corp., Long Island City, N.Y.

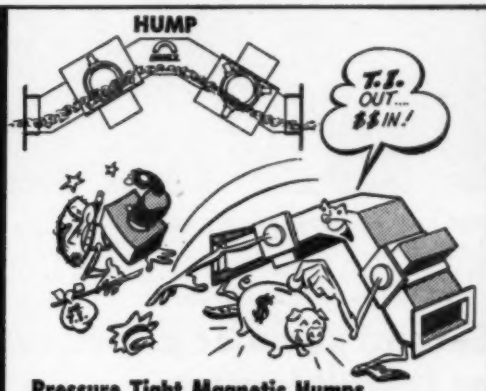
The Jaite Co. is one of the oldest manufacturers of multi-wall paper bags. National now has five kraft pulp mills, 11 corrugated box-making plants, and one kraft bag plant.

AN AWARD FOR outstanding industrial advertising from the National Industrial Advertisers Association was presented to the Riegel Paper Corp. for its advertising campaign on technical industrial papers produced at its mills in Rumford and Riegelsford, New Jersey. More than 300 entries were considered.

ERIEZ MANUFACTURING CO., ERIE, PA., U.S.A. • PRODUCERS OF MAGNETIC SEPARATORS AND SELLERS OF (RCA) ELECTRONIC METAL DETECTORS

Protect Paper Machinery from Harmful Metal with Eriez Permanent Magnetic Separators

Remove dangerous tramp iron in pulp and paper manufacturing operations...eliminate damage to machinery . . . cut product contamination. Installed at strategic points in pulp mills and papermaking production lines, these heavy-duty separators snatch tramp iron from flowing chips, pulp, and slurry. Foreign metals are stopped before they cause damage to moving machinery or find their way into finished products. (In processing of dry materials, particularly in pneumatic systems, magnetic separators eliminate risk of fire or explosion caused by sparks.)

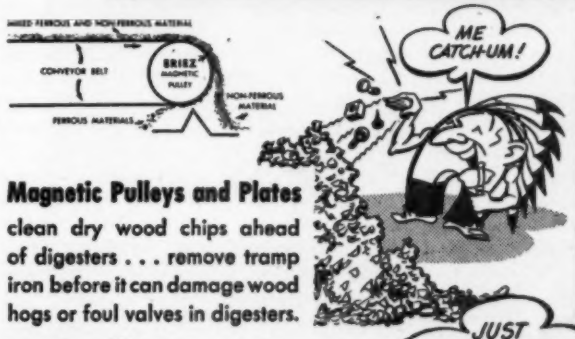


Pressure Tight Magnetic Humps

installed on paper slurry lines have been saving $1000 monthly on the two jordans of a large eastern paper manufacturer. Eriez Humps have eliminated tramp iron troubles for this company.

Eriez Plate-Type Giant Magnets

in head boxes provide protection for refiners, jordans, hydropulpers, and pumps . . . clean slurry of stray metal which can chew up your machinery. This is a proved low-cost means of preventing damage to paper processing equipment.



Magnetic Pulleys and Plates

clean dry wood chips ahead of digesters . . . remove tramp iron before it can damage wood hogs or foul valves in digesters.

Magnetic Slurry Drum

snatches tramp iron right out of slurry line, cleans itself and deposits metal in a tray. ERIEZ TRAPS in liquid flow lines halt pieces of tramp iron...keep them out of pumps.

JUST OFF THE PRESS! GENERAL CATALOG #15, WRITE NOW!
ERIEZ MANUFACTURING COMPANY
215 STATE STREET, ERIE, PA.
MY CONTAMINATION OR SEPARATION PROBLEM IS:
PLEASE SEND LITERATURE ☐ CATALOG #15 ☐
HAVE REPRESENTATIVE CALL ☐ PROMPTLY ☐ WHEN IN AREA
NAME
TITLE
COMPANY NAME
STREET
CITY ZONE STATE
EG

Men from the paper industry attend . . .

Second summer paper course at Lowell Institute

▶▶▶ A cross section of paper and allied industries was indicated in the second summer course given by the Department of Paper Technology at Lowell Textile Institute from June 11 to 22, inclusive. The quota of 20 was filled and some applications had to be refused. The value of this inter-industry conference was again convincingly demonstrated, for individual members of the class were able to contribute expert information during the discussions both in and out of the classroom.

Paper Manufacturing was represented by men from one fine paper mill, one fibreboard mill, one tissue, and by converters of sandpaper and of coated and gummed paper. Six members of the class were from paper merchants' companies. Three were from manufacturing stationers; one from a paper box company. Printing was represented by a college professor and by a member of a printing concern. Manufacturers of equipment and suppliers for the trade also were represented.

Dr. Geoffrey Broughton, head of the Department, conducted the more technical lectures and was assisted in laboratory demonstrations by Messrs. Alfred K. Hobbs and Chung S. Na of the Institute staff. William Bond Wheelwright lectured on paper, its properties and uses, and the requirements of printers and converters.

Guest lecturers for the informal evening sessions included Paul Brown, Tileston & Hollingsworth Co.; Dr. C. W. Stillwell, Dennison Manufacturing Co.; F. W. Partsch, Ross Engineering Corp.; R. O. Page and C. B. Mills, Courier-Citizen Co.; J. Dusseault, A&P Corrugated Box Corp., and J. F. Wright, Allied Chemical and Dye Corp.

Instructive plant visits were made to the Wheelwright Division of The Mead Corp., Leominster, Mass., where both a fourdrinier and a cylinder machine were in operation. Pulp and papermaking and coating were observed at the Champion-International Co., corrugated board conversion and boxmaking at the A&P Corrugated plant in Lowell. Printing was followed at the Courier-Citizen Printing plant, converting at the Brookfield plant of the McLaurin-Jones Co. The final visit was to the paper warehouse of the H. J. Dowd Co., and the Dard Hunter Paper Museum at M.I.T. and Fabric Research Laboratories.

Pacific Coast Paper Mills Marks 50th Year with Expansion

In its silver anniversary year expansion program, the Pacific Coast Paper Mills, Bellingham, Wash., has awarded contracts and started work on a $500,000 building to house its converting process.

President F. J. Herb has announced that special in-line machinery designed for more efficient handling and elimination of factory "traffic jams" will be placed in the new 80 x 315 ft. two-story concrete structure.

The final step of the expansion program also involves structural changes in the existing converting plant, to be used for storage and shipping.

WMC students make tour of paper mills

▶▶▶ ELEVEN STUDENTS in the school of Pulp and Paper Technology of Western Michigan College of Education, Kalamazoo, Mich., spent the week of June 17 inspecting mills in the section of the U.S. and Canada near the eastern end of lake Erie. They were lead by Dr. Alfred H. Nadelman, head of the Pulp and Paper curriculum.

Their first stop was with the Hammermill Paper Co. at Erie, Pa., to see the sulphite and papermaking operations for bond and ledger specialties. On Tuesday they visited the International Paper Co. mills at North Tonowanda, N.Y., and Niagara Falls for instruction in the manufacture of soda pulp, book, bond, twisting, saturating, and ledger papers, and an inspection of the deinking system.

Wednesday found them in Kimberly-Clark's groundwood mill at Niagara Falls, where they also saw machine coating of book papers. In the afternoon they visited Moore Business Forms, Inc. to see the manufacture of forms, sales books, carbon paper, and leterpress and offset printing.

The Upson Co., Lockport, N.Y. was their Thursday morning objective, to see a cylinder machine in action making wall board and specialty coated boards. In the afternoon they watched the manufacture of papermaker's felts at the plant of the Lockport Felt Co.

Friday morning was set aside for a trip through the Ontario Paper Co. at Thorold, Ontario, to see the groundwood and sulphite operations, and the alcohol plant for producing alcohol from waste sulphite liquor. In the afternoon they went to Merriton to observe the manufacture of plain and creped tissue by the Interlake Tissue Mills Co., Ltd. followed by inspection of the manufacture of glassine, greaseproof, drawing and carbonizing papers by the Alliance Paper Mills, Ltd.

Eight graduates now employed

The first students to complete the course in the new Pulp and Paper school of Western Michigan College of Education, were graduated this June. All were placed immediately in jobs for which their training had prepared them.

They were located as follows: Donald L. Hayser, Allied Paper Mills, Kalamazoo, Mich.; Wilbur L. Kite, Lee Paper Co., Vicksburg, Mich.; Elton T. Krogel, Watervliet Paper Co., Watervliet, Mich.; Roger L. McVickar, Otsego Falls Paper Mills, Inc., Otsego, Mich.; Wilbur L. Noel, Kalamazoo Paper Co., Kalamazoo, Mich.; Edward E. Stephenson, Sutherland Paper Co., Kalamazoo, Mich.; Wyman F. Uhl, American Coating Mills, Elkhart, Ind.; Raymond C. Wagner, National Gypsum Co., Kalamazoo, Mich.

Chemical debarking studies begin at Syracuse

▸▸▸ CO-OPERATIVE RESEARCH by industry and education into the chemical debarking of living trees got under way May 1 at State University of New York, College of Forestry, Syracuse. Private co-sponsors are nine pulp and paper companies and a chemical company, with the co-operation of other interested pulp and paper firms.

The study's work plan was discussed at a meeting of the co-sponsors' representatives at the College May 24 with the completed research team. The team, already at work then, includes: Dr. Hugh Wilcox, plant physiologist of California, for the last five years a wood technologist at the Oregon Forest Products Laboratory, Corvallis; Dr. Felix Czabator, forest botanist and pathologist, who has 11 years of forestry and logging experience; Dr. Robert F. Smith, bio-chemist, who has studied the chemistry of proteins recently at the U. of Minnesota; and Douglas C. McIntosh, consulting forester on loan by the Canadian Forest Products Laboratory, Ottawa, where he is a staff wood technologist.

Dr. Wilcox is group leader, with Dr. Czabator in charge of field operations. These began in April with reviews of field equipment and methods of chemical debarking by West Virginia Pulp and Paper Co., International Paper Co., and Armstrong Forest Co.

Development of "simple, efficient, and controllable techniques" for loosening bark of living trees is the aim of the project. "The studies are primarily fundamental in nature, to ascertain the physiological and biological mechanisms involved in bringing about loosening of the bark," Dr. Edwin C. Jahn, research director of the College of Forestry, said.

Other considerations are being taken into account, such as management and logging problems, retention of chemical in the wood and its effect on pulping and quality of the finished paper.

The Huntington Wildlife Experiment Forest, 15,000-acre property of the College in the central Adirondacks, will be the principal site of the work. The project set up for a year ending April 30, 1952, with the way open for renewal, has an initial budget of $64,000. Of this, $50,000 is a grant from the industry sponsors and $14,000 is a contribution in services, supplies, and equipment from the College of Forestry.

The grant is the first one to the new Research Foundation of State University of New York, specially established to encourage and administer private financing of research by State U. personnel and facilities.

Dean Joseph S. Illick, Dr. Hardy L. Shirley, and Dr. Jahn are the college committee for the research. The corresponding industry committee consists of M. H. Collet, K. A. Swenning, L. J. Kugelman, R. R. Drummond, H. G. Schanche, and Y. E. Lebedeff. H. E. Brinckerhoff and W. S. Bromley of the American Pulpwood Association are

GROUP DIRECTING study of Chemical Debarking

Right—

Three members of the four-man research team: Dr. Hugh Wilcox, plant physiologist and team chief; Dr. Felix E. Czabator, forest botanist; and Dr. Robert F. Smith, bio-chemist. Next are Dr. Edwin C. Jahn, College research director; M. H. Collet, West Virginia Pulp and Paper Co., and W. S. Bromley, American Pulpwood Ass'n. Mr. Collet heads the industry committee for the project, of which Mr. Bromley is secretary.

Below—(Read left to right)

Front row: Y. E. Lebedeff, American Smelting and Refining Co.; George Snowden, Mead Corp.; W. S. Bromley, American Pulpwood Ass'n, project secretary; Dr. Hardy S. Shirley, asst. dean at College of Forestry; H. E. Brinckerhoff, American Pulpwood Ass'n; M. H. Collet, West Virginia Pulp and Paper Co., industry committee chairman; Frank Lowthorp, Wise, Corlett and Canfield, counsel; Dr. Edwin C. Jahn, College research director; D. W. Sowers, Westvaco; John Madden, Hollingsworth & Whitney Co.

Middle row: Karl Swenning, Hollingsworth & Whitney; Wm. MacAdam, Champion-International Co.; M. L. Hearn, Brown Co.; Paul Koenig, Glatfelter Pulp Wood Co.; E. L. Giddings, Penobscot Chemical Fibre Co.; P. W. Churchill, Brown Co.; L. J. Freedman, Penobscot Chemical Fibre Co.; L. J. Kugelman, G. A. Pesez, International Paper Co.

Rear row: P. T. Lannan, Westvaco; W. E. Eggleston, Eastern Corp.; R. R. Drummond and E. L. Lamb, Oxford Paper Co.

REPRESENTATIVES OF TWO SPONSORING AGENCIES of Chemical Debarking Research Project: the State University of New York's College of Forestry at Syracuse, nine pulp and paper companies, and a chemical company

project treasurer and secretary, respectively, with an office in room 1712, 220 E. 42nd st., New York 17, N. Y.

Sponsoring companies of the nonprofit unincorporated association supporting the research are International Paper Co., Penobscot Chemical Fibre Co., St. Croix Paper Co., American Smelting & Refining Co., P. H. Glatfelter Co., Brown Co., Hollingsworth & Whitney Co., Oxford Paper Co., Eastern Corp., and West Virginia Pulp and Paper Co. Co-operating are the Armstrong Forest Co. and the Marathan Corp.

International symposium planned for pulp and paper technologists

▶▶▶ A meeting of international interest is scheduled to take place September 17-21, 1951 at the Institute of Paper Chemistry in Appleton, Wis.

This gathering, sponsored jointly by the Institute of Paper Chemistry, the Fundamental Research Committee of TAPPI, and the Wood Chemistry Subcommittee of the Food and Agriculture Organization of the United States, will be known as the International Pulp and Paper Symposium. It will bring together men who have been carrying on fundamental researches in pulp and paper all over the world.

Although the purpose of the meeting is to encourage group discussion and personal contact, a tentative schedule of general sessions has been arranged as follows:

First day (17th)

Opening meeting of the Wood Chemistry Subcommittee, FAO. Subject "Tropical woods as a source of commercial pulp."

Second day (18th)

Continued meeting of the Wood Chemistry Subcommittee, FAO. The forenoon will be devoted to consideration of the subject, "Utilization of agricultural fibers as a means of supplying the pulp demands of wood-poor and other countries." Undoubtedly this will afford wide discussion of reports on the preparation and properties of paper, as well as chemical pulp from bamboo, straw, bagasse, esparto, etc.

The afternoon will be given over to discussing the FAO as an agency for the establishment of international standards and testing methods in the field of wood and wood products.

Third and fourth days (19th & 20th)

A symposium has been arranged for these days on the common technical problems of the pulp and paper industry under the sponsorship of The Institute of Paper Chemistry.

Last day (21st)

Special informal roundtables are arranged to close the meeting, the discussions to cover specialized topics such as the current status of lignin chemistry (a continuation of the round tables hitherto sponsored jointly by The Institute of Paper Chemistry and the Committee on the Chemistry of Plant Products of the National Research Council), the hemicellulose, cellulose, the significance of micro- and submicrostructure of pulp fibers, pulp for chemical conversions, and/or others selected during the earlier sessions. These informal discussions can continue on the following day (Saturday, the 22nd) for those who so desire.

The time of this meeting is particularly fitting, since it follows the International Chemical Conclave to be held in New York the first two weeks in September. The Conclave marks the 75th anniversary of the American Chemical Society, which will be celebrated during the first week in September, and the XIIth International Congress of Pure and Applied Chemistry which will be held the second week.

Registration fee for the Appleton meeting will be $35 per registrant. Technical representatives from the pulp and paper and allied industries who expect to attend, are urged to request registrations forms early. Address Harry F. Lewis, The Institute of Paper Chemistry, Appleton, Wis.

Continental Can Completes Sale of Gould Subsidiary

Sale of all of the capital stock of Gould Paper Co., Lyons Falls, N.Y. to Ralph Luethi, W. Hartford, N.Y., was announced June 22 by Continental Can Co. The amount involved in the transaction was approximately $6,000,000.

The Gould Co., manufacturer of groundwood pulp and specialties, was acquired by Continental in 1945, primarily to insure a supply of paper for its container operations. Since that time, Gould has been operated as a subsidiary and its facilities and production have been improved materially.

With the acquisition by Continental in 1947 of the assets of Hummel-Ross Fibre Corp., Hopewell, Va., manufacturer of kraft board, the Company was assured of an adequate source of supply of this material. Last fall, a decision was made to concentrate all of the Company's paper mill operations at Hopewell, and shortly thereafter an option was granted to the purchasers of the Gould capital stock.

Funds received from this sale are expected to finance expansion of the company's facilities at Hopewell. A new fourdrinier machine, now being built by Bagley & Sewall Co., will be installed early in 1952. The machine will trim 25 inches; it will have 92 dryers and 26 felt dryers and is designed primarily for the manufacture of fiber drum linerboard.

Lesavoy Buys Stevens Point P&P Co. Plant

The idle plant of Stevens Point Pulp & Paper Co., (Div. of John Strange Paper Co.), Stevens Point, Wis., has just been purchased by I. Lawrence Lesavoy, president of Lesavoy Industries.

Output of the mill will be integrated with other Lesavoy mills at Newark, Ohio, and Cheboygan, Mich. It will be known as Jay Pulp & Paper Co.

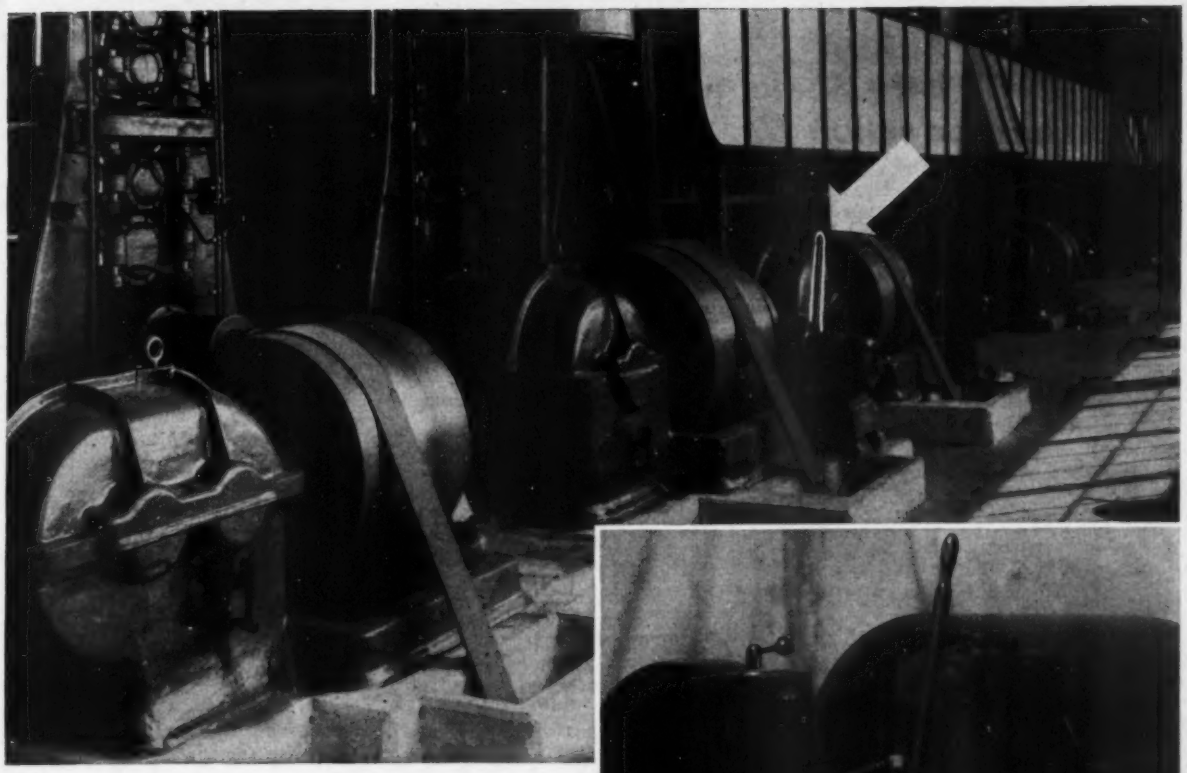
SUPPLEMENTAL POWER has been purchased from a local public utility by United Board and Carton Corp., since the installation of three 500 kv-a. transformers at its Thomson, N. Y., board mill six months ago. The mill was powered previously by its own hydroelectric generated power and steam power. Since this installation, there has been no loss of production time due to poor power conditions, brought about by varying river levels, ice, etc., and the output has increased more than 20 per cent.

A TEXAS OFFICE has been opened by Hammermill Paper Co. (Erie, Pa.), in Dallas—Room 1516 of the Mercantile Securities Building. This will enable the company to provide closer contact and better service to distributors in the mill's Southern Sales Territory.

SUCCESSFUL EXPERIMENTAL work done last summer by Canadian International Paper Corp. has influenced the firm to establish a $500,000 dissolving pulp plant at Timiskaming, Que., Canada.

BOARD MEMBERSHIP of Raynoier Inc., New York City, has been increased from 11 to 13. W. G. Reed, of Seattle, a Rayonier director who has been functioning as the Company's chief operating executive pending selection of a new president, resigned his interim position of executive vice president. No final action has yet been taken on election of a new president.

A SUBSIDIARY of The Richardson Co., Lockland, Ohio, has just been incorporated. The new company will operate as a California unit and will be known as the Richardson Co. of California.



Black-Clawson Drives and Calender Reversing

1. Black-Clawson spiral bevel and hypoid gear drives provide trouble-free operation as well as a clean appearance to the drive side of the paper machine.
2. Rugged, compact, vibrationless and automatically lubricated.
3. Calender drive reversing mechanism to insure quick ejection of calender plugs—simple—safe.
4. Inching drives also available.

In these four elements, mills are offered drives of outstanding performance characteristics.

Consult your Black-Clawson representative on his next call, or write.

THE BLACK-CLAWSON CO.
Hamilton, Ohio

Divisions: SHARTLE BROS. MACHINE CO., Middletown, Ohio
DILTS MACHINE WORKS, Fulton, New York
Western Sales Office: Mayer Bldg., Portland, Oregon
Southern Sales Office: 937 Coventry Road, Decatur, Ga.
Associate: THE ALEXANDER FLECK LIMITED, Ottawa, Canada
Subsidiary: B-C INTERNATIONAL, LTD., Greener House
66/68 Haymarket, London, S. W. 1, England

Sulphur Industry Seeks to Increase Production

▶▶▶ The U. S. sulphur industry, now operating at the highest level in the nation's history, is bringing new sources of the strategic mineral into production that will play an important part in the eventual solution of the current shortage.

Recognition of the industry's all-out efforts to substantially increase the supply of sulphur was made by Dr. James Boyd, Defense Minerals Administrator and director of the Bureau of Mines, in testimony before a special subcommittee of the House Interstate and Foreign Commerce Committee.

The subcommittee, under the chairmanship of Rep. Lindley Beckworth (D-Tex), is conducting hearings in Washington into the newsprint situation and what effect the sulphur shortage is having on the supply of paper.

The U. S. last year produced 5,350,000 long tons of sulphur to furnish about half the world's supply. Despite production that is now about two-and-a-half times prewar levels, the supply is expected to fall short of demand this year by approximately 1,000,000 tons.

Terming the sulphur shortage "critical," Dr. Boyd asserted the problem is "the kind that can be solved" and declared that this is a job for private industry and not the government. The sulphur industry, he said, is "doing all it can" to step up production.

"This is an industrial effort," he told the committee. "It is not necessary for the government to take a part in it unless the industry requires the aid that the Defense Production Act has given us to help them to do the job."

Dr. Boyd said U. S. sulphur-producing companies several years ago saw that a shortage was inevitable and immediately took steps to find and develop new sources of supply. He listed industry projects now in progress to expand production, including the multimillion dollar amphibious operation of Freeport Sulphur Company to mine sulphur beneath Bay Ste. Elaine in the Louisiana bayou country.

This project, the first of its kind, is not expected to be in operation before the end of 1952. It is one of three new sulphur domes being developed in this country which, at full operation, are expected to produce about 530,000 tons annually. Dr. Boyd warned, however, that a substantial portion of this capacity is likely to be marginal.

While the Bay Ste. Elaine dome is not a large deposit, and may not prove commercially profitable on the basis of the present frozen price of sulphur, Freeport is going ahead with the project in order to help solve the supply problem as rapidly as possible.

Dr. Boyd has said there are ample reserves of sulphur in other forms, such as pyrites and gypsum, but these and others, he explained, are marginal operations and a matter of economics.

As the present sources of sulphur become depleted, he continued, the cost of production will rise, and so, too, will the price of sulphur.

"The result is that new deposits, which are now marginal or uneconomic, will become economic," he testified. "That is the history of the mineral industry."

He said it is true of sulphur, "as almost all of our minerals," that future production doubtlessly will be a more expensive undertaking and a more expensive product."

Included in this list were: Paper and paperboard, *tight supply;* sulphur and sulphuric acid, *very short supply.*

New Canadian Plant Will Produce Sulphur Dioxide from By-product Gases

A new plant will be erected at Copper Cliff, Ontario, Canada, by Canadian Industries Ltd., Montreal, to produce liquid sulphur dioxide from by-product gases arising from the operation of the oxygen flash smelting process recently developed by the International Nickel Co.

Plans for this plant have resulted from extensive research and exploration by C. I. Ltd. and Inco, directed towards the commercial utilization of waste fumes from the giant smelter. When in operation, it is expected the plant will produce about 90,000 tons of liquid sulphur dioxide per year. For many years, Canadian Industries has been producing sulphuric acid from Inco's waste gases; this production also will undergo a major expansion this year.

Liquid sulphur dioxide is not made in Canada at the present time although Canadian Industries Ltd. produced it in small quantities from 1932 to 1945. Supplies are currently obtained from the U.S.A. at high cost, with resultant small consumption. The new development is to place liquid sulphur dioxide in the category of a tonnage chemical available to large potential consumers at a fraction of its present cost. Potential large consumers are sulphite pulp, newsprint and sulphuric acid manufacturers who now depend mainly on elemental sulphur. This sulphur, currently in short supply and expected to become even scarcer, is imported from Texas and Louisiana. In 1950, imports were over 385,000 tons, valued at about $7,500,000, U.S. funds.

Some Canadian Mills May Produce Own Sulphur

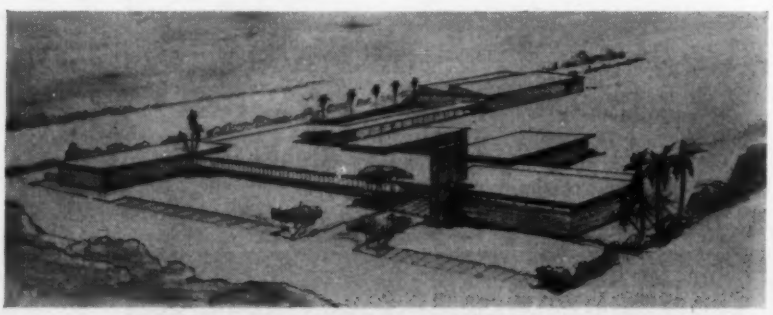
Pulp and paper mills of Britannia Beach, B.C., may start their own plants to produce sulphur.

A big stockpile of iron pyrites in this mining town 40 miles north of Vancouver now is being whittled down by shipments to France and Japan. The pyrites contains about 50 per cent sulphur.

Japanese buyers have been taking approximately 8,000 tons a month from the 100,000-ton stockpile.

Roots-Connersville Spending for Expansion

A construction program to cost a million and a half dollars has been announced for Roots-Connersville Blower Corp., Connersville, Ind. This program will include a new erection floor, expansion of present test facilities, manufacturing space, and machine tools. The new facilities will enable Roots-



OFFICE BUILDING and Development Center for Infilco Incorporated, Tucson, Arizona. Especially designed for the Southwest with umbrella roof to guard against direct sunlight. Note strip-type windows running in a horizontal band above head level and sheltered by overhanging eaves. The "E" shaped plan provides for 100 per cent outside offices. The building is treated with acoustical tile, has a resilient floor covering and complete winter-summer air-conditioning

100 Years of Service

100 YEARS is a *large* sector of time. Back in 1851, when Charles Morningstar, grandfather of Joseph Morningstar, present head of Morningstar, Nicol, Inc., founded the company, the California Gold Rush was at its height; Millard Fillmore was President of the United States, Daniel Webster was Secretary of State. Henry Clay's effort toward the admission of New Mexico and Utah as Territories had just succeeded. From a humble beginning, so long ago, the Morningstar Company has grown until it now has operations in 20 states. Especially rapid progress and expansion has occurred during the past decade. In addition to the plants and sales activities listed on this page, Morningstar, Nicol, Inc. also imports Tapioca Flour from Brazil, Arrowroot from the West Indies, as well as Starches and tropical Gums. You will find us keenly alert to every opportunity to render a valuable service to all industries.

PRODUCTION AND SALES FACILITIES

The extensive, highly efficient facilities of the following plants and laboratories are at your service.

INDUSTRIAL ADHESIVES
SYNTHETIC RESIN AND LATEX CEMENTS
TEXTILE MILL SPECIALTIES
PAPER MILL SPECIALTIES

PAISLEY PRODUCTS, INC.
PLANTS AT CHICAGO, ILL. AND NEW YORK CITY
Sales Offices and representation in principal cities

DEXTRINE AND STARCH PRODUCTS
MORNINGSTAR, NICOL, INC.
PLANT AT HAWTHORNE, N.J.

POTATO STARCH
AROOSTOOK POTATO PRODUCTS INC.
Houlton, Maine
MAGIC VALLEY PROCESSING CO.
Twin Falls, Idaho
NEW ENGLAND STARCH CO.
Houlton and Mars Hill, Maine

MORNINGSTAR, NICOL, INC.

630 WEST 51st STREET
NEW YORK 19, NEW YORK

1770 CANALPORT AVENUE
CHICAGO 16, ILLINOIS

Connersville to test the largest centrifugal blowers and compressors ever designed, which it is now building.

Roots-Connersville is one of ten operating companies of the Dresser Industries, Inc.

120 Years of Continuous Business Celebrated by Philadelphia Quartz Co.

In the year 1831, Joseph Elkinton opened the doors of his soap and candle enterprise in Philadelphia. From that beginning, grew the Philadelphia Quartz Co. which this year is celebrating 120 years of continuous business.

Thomas Elkinton, a son of the founder, leaned toward technology, and his attention was directed to a chemical, silicate of soda, mentioned in a scientific journal. Early in 1858, equipment was bought to experiment with the product. The use of silicate of soda in Elkinton soaps showed a distinct advantage for increasing washing action. The company's business increased and larger plants were needed. Then expansion turned toward the West and seven plants are now operated by the parent company. Two subsidiary companies also handle the trade on the Pacific coast and in Canada.

The company's research program has developed many industrial applications for silicate of soda, including paper, paperboard, and ceramics.

Thomas W. Elkinton, great grandson of the founder, is president of the Eastern and Canadian companies and a director of the California company.

Nopco Old-timers Receive Awards and Emblems

Gold service emblems were awarded 23 employees who were inducted into the Nopco 15-year Club during ceremonies held recently by Nopco Chemical Co., Harrison, N.J. These employees will hereafter receive three weeks vacation instead of the customary two weeks.

At the same meeting, eleven 25-year employees were awarded gold watches.

The new members increase the Club's membership to 169, representing 22 per cent of the Company's total personnel.

Membership of Rice Barton 1837 Club now Totals 4274

The second annual dinner meeting of the Rice Barton 1837 Club was held in the ballroom of the Hotel Sheraton in Worcester, Mass., June 6.

The Club is composed of the 202 employees who have been with the Corporation ten years or more. Its name stems from the date of the founding of the present Rice Barton Corp. Present members of the Club with 30 or more years of service represent a total of 1214 years of employment; members with 20-30 years of service represent a total of 1709 years; and members with 10-20 years represent a total of 1349 years, with a grand total of all groups of 4272 years of service.

At the dinner ceremonies, George Sumner Barton, board chairman, presented gold watches to the 30-year members. Charles Sumner Barton, president, presented emblem buttons to the 20- and 10-year members.

Diamond Alkali Has Completed Army Chemical Center Modernization

Six steps have been outlined in the modernization-expansion program completed last month by Diamond Alkali Co., at its electrolytic chlorine-caustic soda plant at Army Chemical Center, Md.

This rehabilitation project is said to be the most extensive of its kind since the plant was first built by the Government in 1942, and represents an investment by Diamond of nearly $400,000. The additional capacity thus secured has enabled the company to boost its output of caustic soda and chlorine by approximately 30 per cent above former levels.

Swenson Evaporator Adds to Territory Out of Houston Office

Rapid growth of the process industries in the Southwest has caused the Whiting Corporation, Harvey, Ill., to extend the Swenson Evaporator Co.'s territory under the Houston, Texas, office. The new territory will include not only the state of Texas, but also the state of Louisiana, plus a portion of southern Arkansas and a section of western Mississippi, including Natchez. Swenson is a division of the Whiting Corp.

W. F. Scanlan

The announcement also states that Wm. F. Scanlan has been added to the staff of the Houston District Sales Office. During Mr. Scanlan's four years with Swenson, he has handled engineering, sales, and operating assignments in both the chemical and pulp and paper divisions. He is well qualified to work with the process industries in solving their equipment problems as they relate to evaporation, crystallization, filtration, and spray drying operations.

E. C. Atkins Assigns Mfg. Rights on Chainsaw

The rights to manufacture and distribute the Atkins Electric Chainsaw have been assigned by E. C. Atkins and Co., Indianapolis, Ind., to the L-M Equipment Co., Portland, Oregon.

Atkins Company will now devote all chainsaw activities to the research, manufacture and distribution of chains and cutter bars. The company is developing a complete new line of chains for all makes, models, and sizes of chainsaws to be known as Silver Steel Chain. It will be made from a new type of steel; will be easy to sharpen, and extremely fast cutting.

FURTHER EXPANSION of the Houston, Texas, plant of Atlas Mineral Products Co., Mertztown, Pa., has been announced. The new construction will include a modern lining shop and storage facilities which will give the firm one of the most modern and best equipped lining shops in the Southwest.

Gordon H. Cole, the company's Washington industrial manager, has been transferred to the government project office of the firm, where he will direct Navy, U.S. Coast Guard and Maritime operations.

HOUSTON OFFICES of Leeds & Northrup Co., Philadelphia, manufacturers of electrical measuring instruments, automatic controls, and heat-treating furnaces, have been moved to 2480 Times Blvd., Houston 5, Texas, from the former location, 1314 Texas Ave. The new offices provide better facilities.

ESTABLISHMENT OF the trade name "Kymene 138" for a wet-strength resin for paper has been announced by Hercules Powder Co. This wet-strength resin was formerly known as Resin 138.

THE SCALE BUSINESS of the Philadelphia Division of The Yale & Towne Manufacturing Co. has been purchased by Detecto Scales, Inc., Brooklyn, N.Y. The transaction was effective June 1.

A SUPER-FOURDRINIER will be built by the Bagley & Sewall Co., Watertown, N. Y., for the Hopewell, Va., mill of Continental Can Corp. First specifications call for the machine to have a wire width of 270 inches; trim width of 250 inches. It will have a maximum speed of 1500 fpm; capacity 600 tons per 24 hours.

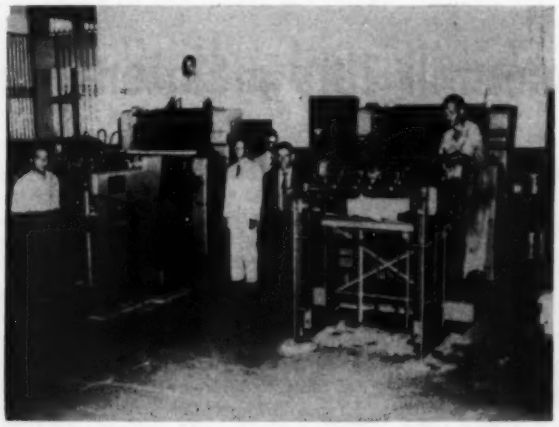
OCCUPATION OF OFFICES at 970 Sun Life Building, Montreal 2, Que., Canada, has been announced by Sutherland Refiner Ltd.

NOW REPRESENTING the G. D. Jenssen Co., Inc., Watertown, N.Y., is the James Brinkley Co., sales engineers located at 417 — 9th Avenue South, Seattle 4, Wash. This appointment was effective June 1 and was due to the resignation of A. H. Lundberg.

The Paper Industry Pictured Highlights

Open house features Samuel M. Langston Co.'s 50th Anniversary. Friends and families of employees had opportunity to see the operations of this leading paper machinery manufacturer.

The winner—Dayton art student James A. Rawlings receives $250 check from E. T. Gardner, president of Gardner Board & Carton Co. Rawlings designed the prize-winning company emblem.

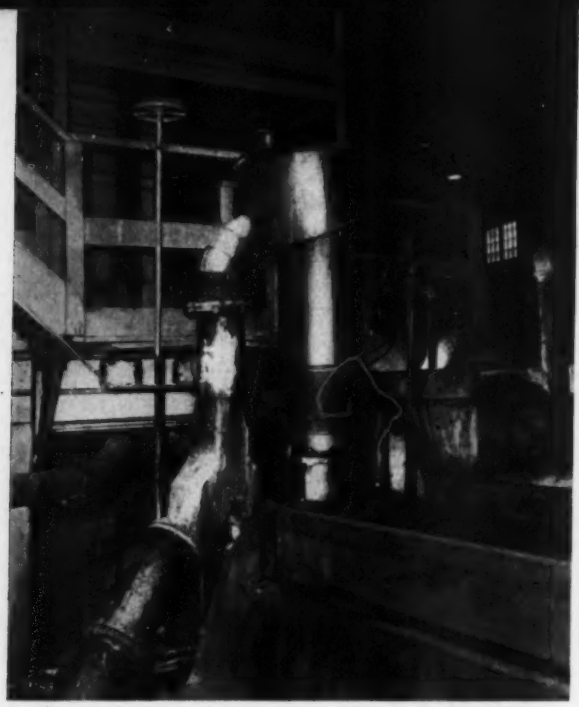


Brazilian currency is printed at the Casa de Moeda (Brazil's mint) in Rio de Janeiro on these recently installed single color offset presses built by Electric Boat Company.

Papermaking exhibit at Nekoosa Edwards Paper Co. is examined by editors attending the annual summer conference of the Wisconsin Industrial Editors Association.

Executives of Inland Container Corp's several plants confer at Middletown. Seated (l to r) R. Mohlman, Indianapolis; A. Bickle, Detroit; E. W. Rowles, production manager; W. Davis, Macon, Ga.; standing, G. Gordon, Indianapolis; C. Clark, Evansville; E. Hagel, Indianapolis; N. Neikirk, Milwaukee; Harris Downing, sales manager.

Service was the theme of the Marketing Conference held recently by the Dicalite Division, Great Lakes Carbon Corp., at the Edgewater Beach Hotel in Chicago. Top management, technical, production, sales, advertising and traffic departments were represented. George Skakel, Jr., vice president, is on right at head of table.



STUFF BOX fabricated from stainless steel by electric welding

WHITE WATER TRAYS and trough welded from stainless steel sheet

How Hammermill cuts maintenance

PIPE GRADUATION AND BEND of stainless steel made by electric welding

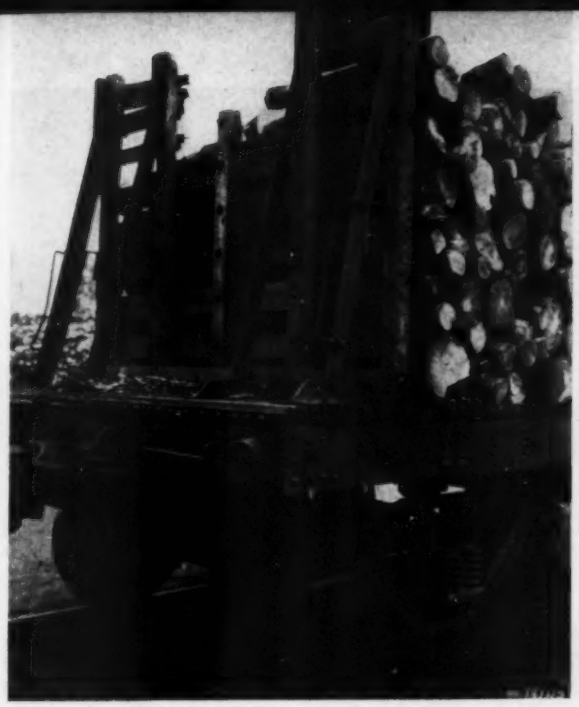
CORNERS are protected from fork trucks by welding steel plate around doorways

▶▶▶ HAMMERMILL PAPER CO. has made steadily increasing use of electric arc welding in mill repair and maintenance work during recent years. In the last stages of its postwar $8,000,000 expansion program, this firm, employing some 2000 personnel, regularly produces between 600,000 and 650,000 pounds of paper per day, and efficient maintenance of the vast outlay of plant equipment is of prime importance in the production picture.

Electric arc welding, supplemented by other types of welding, has received continuous study and development here. This is indicated by the increased use of welding machines and welders in maintenance work. Formerly, the department included but one welding crew with one machine. Now over a half dozen such machines are in use regularly with skilled welders spotted throughout the various branches of the maintenance department.

Specific illustrations of maintenance welding here are very diversified and constantly increasing in number with the study of such applications, aimed at, and resulting in, reduction in shut-down time, reduction in number and cost of replacement parts, and simplification and reduction in cost of the over-all maintenance program.

Several good examples of electric arc welding in good maintenance practice are afforded by the sheet metal shop at Hammermill. The handling of great



OLD pulp car ends were easily damaged

NEW welded ends give trouble-free service

costs with electric welding

C. W. LYTTON
The Lincoln Electric Co.

quantities of water and other fluids in a paper mill has always produced its share of "bugs" for maintenance men, and many of these problems resolve to sheet metal and pipe fabrications.

For instance, the collection of white water from paper machines is accomplished by sheet metal trays underneath the machine bed. Formerly these trays were fabricated by riveting and soldering, were cumbersome and angular, and developed leaks.

Now a typical tray, about 30 inches by 16 feet, and several feet from top to bottom, is a streamlined, electric welded fabrication of stainless steel. Angle iron is welded to tray edges to stiffen the structure. Three-foot sections of 14 to 16 gauge stainless steel are rolled, semi-circular, for the trough bottom, an outlet hole is cut near the center and an overflow hole at one end.

It was reported that maintenance of such fabrications was practically nil. In this type of welding, type 302 rod, as well as stainless steel sheet metal 302, are primarily used.

Similarly, throughout the plant many pipes and fittings that are being renewed and/or replaced are being done so with stainless steel piping and fabrications, many of which are made in the shop or on the spot in the plant; and others, beyond the capacity of shop rolling equipment, for instance, are being farmed out.

In piping, thickness of the stainless steel fabrications range from 16 gauge to ⅛ inch, ordinarily, and the work is done with type 302 rod and metal in some cases, and 318 in others. It has been found that the electric welded applications extend the life of such installations almost indefinitely and reduce the need of maintenance. In some cases, costly and hard-to-get cast iron and lead fittings and joints have been done away with and over-all economy effected. Early in the development of the use of electric welded piping at Hammermill, welded pieces were tested up to 110 and 120 pounds pressure for a safety measure. In welding 16 and 14 gauge pipe, pieces are tacked every few inches and the final weld made, usually, with one pass. Positioning and current strength are left to the judgment of individual welders who know job requirements.

Another instance where electric welding serves here to effect an economy in maintenance and plant operation is that of the fabrication of end braces or brackets for flat cars that bring thousands of cords of pulp wood to the plant annually from the mill woodyard. Study of the problem of battered and rapidly obsolete end brackets brought about an evolution from the former wood-and-steel, bolted end brackets to the present steel-plate-and-angle-iron, electric welded fabrication. The latter is proving out unusually well under repeated hard usage.

Four-by-four angle iron is used to brace and strengthen boiler plate in these end brackets for railroad flat cars, and "Fleetweld 5" rod is used for both position and roll welding.

Another graphic illustration of welding in the solution of a maintenance problem is afforded by this plant's experience in protecting corners of doorways and column bases where jitney traffic is heavy. Jitneys carrying heavy palletized loads of paper fiber to and from various processes in the plant sometimes bump doorway corners and column bases, resulting not only in damage to the masonry at such points but also in heavy damage to jitney tires and frequent replacement of same.

Old boiler plate was formed up to present a curved surface around doorway upright edges, serving to glance off any blows, two quarter rounds of such steel plate being electric welded to the doorway I-beam uprights on each side. This innovation serves to prevent crumbling of doorway edges as well as to deflect the jitney tire instead of cutting into it.

Similarly, around column bases steel plate was formed to taper upward about 18 inches from the floor, enclosing a concrete fill-in, and was electric welded into place. Corners were rounded, of course, and this factor, together with the tapering construction, presents the least possible amount of obstruction to the offending jitney.

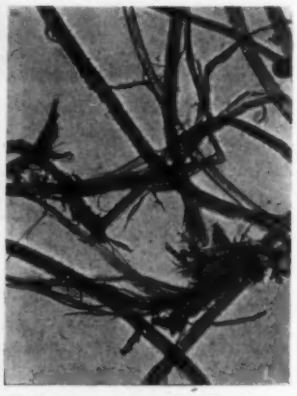
Why don't your wet felts last longer?

MODERN PAPER MAKING isn't possible without woolen felts. An integral part of both cylinder and fourdrinier machines, woolen felts serve two main purposes: to couch the formed web from cylinder molds and wires and to support the wet sheet as it passes through the presses

THE ANSWER: Three types of deterioration—mechanical, chemical and biological. Knowing the why's and wherefore's will help you extend felt life.

Photomicrographs courtesy of The Orr Felt and Blanket Co.

VIRGIN WOOL FIBER—surface structure of epidermal cells or scales protect the fiber



DAMAGED WOOL FIBER due to mechanical, chemical and biological deterioration

B. F. SHEMA
The Institute of Paper Chemistry

Woolen papermakers felts are indispensable in the manufacture of quality paper and paperboard. Virgin wool fibers have those essential characteristics which provide the properties required for proper sheet formation and for the drying of paper. No other type of fiber has the complete combination of chemical and physical properties necessary to replace virgin wool for these purposes, although at the present time synthetic fibers, such as nylon, may be incorporated into the felt in the woof direction. The use of nylon has increased the strength and resistance to abrasion of the felt and has improved such properties as heat stability, shrinkage, and elasticity in the finished product.

Properties of wool

Wool is a complex protein called keratin, insoluble in the usual solvents. This protein is amphoteric—that is, it exhibits acid as well as basic properties with the basic properties predominating. On hydrolysis wool yields 18 different amino acids. These acids are linked together in polypeptide chains with cross links between adjacent chains. The chains are linked by salt bridges to form grids or configurations which could be either of the folded or the spiral type. Stability is given to the configuration by the cross-linkages between the component chains of the grid, by attractive forces between neighboring side chains, and by hydrogen bonds within the fold or spiral. It is usually assumed that the folded grid is a feature of both the amorphous and the crystalline region of the wool fibers.

When a wool fiber is stretched, extension is confined in the early stages to the less ordered regions but, at extensions above 20 per cent, the folds or spirals in the crystalline phase gradually becomes more linear. The normal unstretched folded molecule is commonly called alpha-keratin, whereas the stretched or linear molecule is called beta-keratin. It is this ability of the keratin molecule to stretch that imparts the very essential elastic or resilient property to the wool fiber. The cross linkages prevent slipping between the chains, thus contributing materially to the strength of the fiber.

Physically, wool fiber consists of three types of cells; (1) the epidermal cells or scales, (2) the cortex, and (3) the medulla or central core.

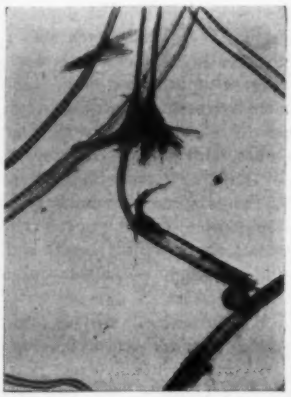
The epidermis or the outer portion of the wool fiber is made up of cells which are scale-like in nature. These wedge-shaped cells overlap with the free ends projecting outward and toward the tip of the fiber. The number of scales per fiber varies considerably. In the finest wools one scale is usually large enough to encircle the fiber whereas, in the coarser wools, the number increases with the diameter of the fiber. The thickness of the scales also varies but the usual range is from 0.5 to 1.0 micron. The primary function of the scales is to pro-

SULPHURIC ACID (hot, above 20 per cent) has hydrolyzed the epidermis; wool surface is now water soluble

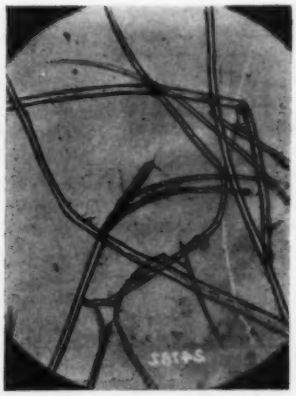
HYDROCHLORIC ACID (hot, above 10 per cent) causes ball-like swelling; fiber is now susceptible to secondary damage

ALKALI swells the fiber; epidermis is softened and fiber is highly susceptible to abrasion damage

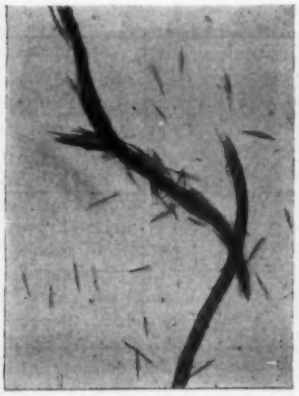
BLEACHING AGENTS weaken the scaly portion of the fiber surface; resistance to chemicals and bacteria is lowered



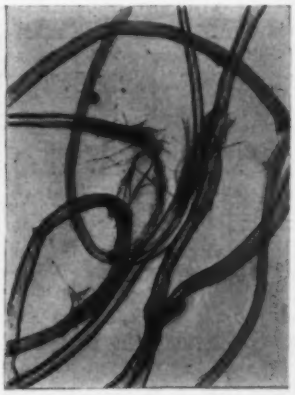
MECHANICAL ABRASION—fiber is worn through from rubbing against a hard surface; it is now more readily attacked by chemicals and bacteria



FATIGUE from constant bending and re-bending causes the fibers to split like trees in a windstorm



BIOLOGICAL DEGRADATION—epidermis has been completely digested and the fibrils in the wool fiber became disengaged



BACTERIA damaged the wool fibers in this felt; primary damage could have been either chemical or mechanical

tect the cortex of the fiber. Practically, these scales impart to the wool fiber a surface structure which make felting possible.

The bulk of the fiber is made up of spindle-shaped cortical cells. These cells range from 80 to 110 microns in length, 2 to 5 microns in width, and 1.2 to 2.6 microns in thickness. They are imbedded and cemented together with a proteinaceous binding material. This binding material is a short chained keratin-like substance and differs chemically from the cortical cells. The tensile strength and the elasticity of the wool fiber are dependent to a large extent on the condition of the cortical cells and the cementing material.

The third type of cells found in wool fiber are the medullary cells. These cells are not always present, although they are usually found in the medium and coarse wools. The size and shapes of the medulla vary greatly. It may consist of a single chain or a series of chains of cells. The arrangement of the medulla in the wool fiber may be fragmental, interrupted, or continuous. The primary function of the medulla is to increase the protective properties of the fiber by providing internal air spaces.

There are three primary causes of decreased felt life in a paper mill—chemical degradation, mechanical degradation, and biological degradation.

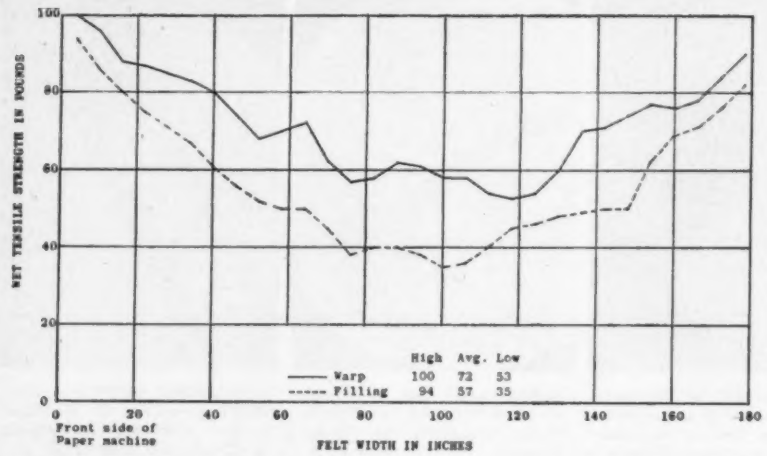
Chemical degradation

Wool is a resistant material and is hydrolyzed only with great difficulty. The peptide linkages are stable within the *p*H range of 4.0 to 7.5 and are not irreversibly ruptured in the range of about 3 to 9. Papermaking operations are usually carried out at a *p*H of 4.3 to 7.5 and, uncommonly, as high as 8.5. Oxidizing and reducing agents will attack wool but these are not likely to be present in a paper mill system.

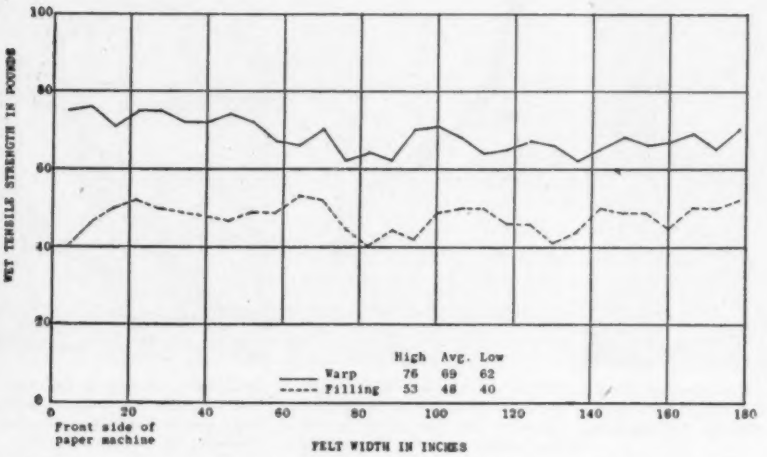
Various workers in the textile field have reported studies on the effect of alkali or alkaline materials on the strength and elasticity of wool. A *p*H of 8.5 and higher has a deleterious effect upon the structure of the fiber and on its resistance to biological attack.

Alkali damage is relatively common, but is perhaps more so in the textile field where wool is used for the manufacture of clothing rather than for papermakers felt. It has been shown that small residuals of alkali are sometimes retained by the fiber after the "scouring" operation if the wool is not properly washed. That is, the wool fiber adsorbs the alkaline soap or any other alkaline material used in the scouring operation. When this woolen felt is moistened, the alkali dissolves and reacts with the wool, thus weakening and loosening the scales which act as barriers to the penetration of various microorganisms.

Various phosphates have also been incriminated as having an adverse effect on the wool fiber in papermakers felt. The action of the phosphate is not clearly understood, but it is believed that its presence contributes to a more balanced nutrient medium for the micro-



EXCESSIVE WEAR in center of felt caused by overcrowning of press rolls is indicated by the wet tensile test of a felt that ran 10 days on the paper machine (H. Waterbury & Sons Co.)



UNIFORM WEAR across full width of felt after the crown condition was corrected; felt ran 13 days on paper machine (H. Waterbury & Sons Co.)

organisms, thus stimulating their growth and the secretion of proteolytic enzymes which result in an accelerated rate of felt deterioration.

In general, alkalies attack the disulphide groups in the cystine portion of the keratin molecule. Investigations have shown that this action results in increased swelling, solubility and, ultimately, a complete hydrolysis of the wool fiber. The degree of this action depends upon the temperature and the concentration of the alkali in solution.

Under ordinary operating conditions, chemical degradation is not common in most paper mills. However, when unusually short felt life is experienced, it is desirable to inspect any changes that may have been made in the mill system or changes in the furnish, such as the introduction of chemicals inimical to wool fibers. For example, if appreciable concentrations of reducing agents, such as calcium bisulphite, are a part of the furnish, short felt life usually results. This type of degradation usually results in a marked reduction of the resistance of the fiber to extension and also results in increased swelling and weakening of the fibers. On drying, the degraded fibers become supercontracted.

Under normal operating conditions, especially in the more temperate climates, mechanical degradation is probably the chief factor in contributing to the short life of woolen felts. It is also, probably, the greatest single factor which predisposes the woolen felt to microbiological attack.

Mechanical degradation

The process of mechanical degradation is obviously one of abrasion. Such abrading materials as shower water, fibers, various clays, and other materials are always present in the furnishes of most papers. These materials individually and collectively may contribute to the mechanical wear of a papermakers felt. Herein lies a common misunderstanding about the cause of mechanical degradation. Shower water, fibers, clays, etc., are not usually thought of as being abrasive, and mechanical wear is interpreted as being caused by the rubbing of the felt against some sharp object or some other part of the paper machine.

The physical changes occurring on a woolen fiber during mechanical abrasion are: first, the removal of the epithelial scales or cells; second, the wearing of the cortex with sufficient cleavage to expose the various fibrils; and third, a natural transverse breaking of the fiber or the longitudinal splitting of the fiber, causing a brushed or brooming effect on the end of the fiber which exposes the cortical cells to the surrounding medium and subjecting the matrix to the action of microorganisms.

To a large extent, mechanical degradation is unavoidable and, because of the seriousness of this type of degradation, attempts have been made to reduce it by treating the woolen fibers. Three different approaches have been suggested for increasing the resistance of wool fiber to mechanical wear. First, treat the fiber with a chemical reagent, which will build new cross-linkages, or strengthen the existing cross-linkages in the wool molecule; second, superficially coat the wool fibers with a resin; and, third, build up high polymers within the individual fiber.

Studies on the use of various compounds to build or strengthen the cross-linkages, to coat the individual fibers with resin, and to build high polymers within the fiber have shown that these approaches have very promising possibilities. Studies reported to date have indicated that it is not feasible to produce a fiber which retains all the characteristics required of a good papermakers felt, such as elasticity, water-retaining property, etc. The fact is, however, that if these disadvantages can be overcome, it will be possible to reduce significantly mechanical wear and biological degradation of woolen felts.

Biological degradation

As stated previously, wool is a complex protein called keratin, which is made up of a large number of amino acids. This keratin can be degraded by the action of bacteria and various proteolytic enzymes. Such proteolytic activity is usually confined to several genera of bacteria and fungi. The organisms most commonly found in woolen felts in paper mills are bacteria, although the relatively common pink rot is caused by a fungus. The bacteria which attack woolen felts in paper mills are usually species of *Bacillus, Pseudomonas,* and *Alkaligines.* Several species of *Actinomyces* and various other species of fungi have also been shown to degrade wool.

Action of bacteria on wool is enzy-

matic in nature. The organisms commonly attacking papermakers felt are widely distributed in nature and, consequently, occur in such natural habitats as air, water, soil, animal residues, and various vegetable matters. Most of these are purely saprophytic and are not commonly associated with human disease. Because of the fact that bacteriological degradation of papermakers felt results from the action of enzymes secreted by the bacteria, the factors affecting the breakdown of the wool keratin fall within the range of the environmental requirements of those enzymes. That is to say, those conditions which are favorable for enzymatic action are usually favorable for the growth of bacteria.

Factors affecting bacterial growth

Some of these factors are as follows: first, a supply of nutrients other than those supplied by the wool fiber. Very few species of bacteria are able to utilize keratin in the absence of other inorganic and organic nutrients. Only a small amount of these complemental foods are required for the bacteria to attack and degrade wool fiber; nevertheless, bacterial degradation of woolen fibers is dependent to a large extent upon their availability. These are usually present in paper mill systems.

A second factor is the moisture content. This environmental factor is essential for the growth and reproduction of bacteria. The moisture content of a woolen felt on a paper machine is optimum for the growth of proteolytic organisms.

The third factor is temperature. The temperature in a mill system is usually optimum for the growth of a least one of the species of bacteria which can degrade papermakers' felts. It is interesting to note that the optimum temperature range of these bacteria is from approximately 60 to 120 F. It has also been reported that a few species of thermophylic bacteria are able to degrade papermakers' felts.

A fourth factor is the hydrogen-ion concentration (*p*H). The *p*H value of the paper furnish in most mills is normally within the range of normal growth of most proteolytic bacteria. *p*H values between 4 and 5.5 usually inhibit the growth of most bacteria. Optimum *p*H conditions for the growth of bacteria usually range from 6.5 to about 8.0. Thus, in general, a higher *p*H is more conducive to the growth of bacteria and also for chemical degradation of wool.

Primary injury of the woolen fiber is an important factor to be considered in the process of microbiological degradation of woolen cloth. The fiber can be injured by mechanical abrasion and by the effect of chemical action. The scales are loosened or worn away, resulting in the formation of small portals of entry for the bacteria. Once the bacteria enter the wool fiber, processes of degradation begin by enzymatic action. These enzymes digest the cementing material, thus rupturing the fiber and destroying the alignment of the cortical cells. When this happens the fiber may be broken at the point of rupture either by the force of the shower water or through mechanical abrasion by the various components of the furnish.

Finding the cause

It is often difficult to distinguish between bacterial degradation, chemical degradation, and mechanical degradation since the latter two are almost always present in varying degrees—especially mechanical degradation. Because these two forms of degradation affect the amount and the severity of bacterial degradation, it may be almost impossible to determine which of the agents caused the initial breakdown of the felt. Bacterial degradation on the other hand, can be identified with a fair degree of certainty by staining the woolen fibers with a biological stain.

A suitable method for this determination is to stain the woolen fiber with an aqueous solution of safranin. With this method the degree of bacterial attack is determined by the extent to which the fibers absorb the stain. Normal undamaged fibers do not absorb the stain, whereas the fibers which have undergone bacterial degradation absorb the stain in the areas of injury. The intensity of the stain varies with the degree of injury.

Oftentimes, chemical damage (especially acid damage) will show up on the woolen fiber as longitudinal striations on the scales. Severe alkali damage usually results in a dissolution of the cortical cells. Chemical attack can be distinguished from bacterial attack by the uniformity of the degradation. Usually, chemical attack is uniform over the entire fiber, whereas bacterial damage often occurs in isolated areas on the individual fiber or on the felt—that is, certain areas are more severely attacked than others. However, in extreme cases, felts can be attacked by microorganisms in a very uniform manner. This, however, is the exception rather than the rule.

Preventing deterioration

Various methods for the control of microbiological degradation of woolen felt have been suggested. Perhaps the simplest method is the control of the *p*H of the stock. Whenever possible, this should be run at a *p*H of less than 5 or 5.5. When the furnish has a *p*H greater than 6, bacterial activity is greatly increased and serious felt deterioration usually results. If it is necessary to run at a *p*H greater than 6 it is suggested that the *p*H of the shower water be adjusted to 5 or 5.5, preferably less if possible.

Another method of felt preservation is a critical examination of the paper furnish and the chemicals used in the furnish. Those materials which may potentially attack wool should be eliminated whenever possible. If there is any possibility of the occurrence of dangerous chemicals in the furnish remedial measures should be put into effect.

Various treatments for woolen felts to preserve them or to make them resistant to the growth of microorganisms have been suggested. For example, various toxicants have been recommended and some mills have had favorable experiences with such treatments. The chemicals most commonly used are various chlorinated phenols, organic mercury compounds, synthetic organic compounds, and combinations of these materials. These compounds are usually applied to the felt either as a spray or as a bath.

After the felt has been treated with the toxicant solution, the active agents may be precipitated on the fiber by passing the woolen felt through a mild acid bath. This treatment lasts for varying periods depending upon the type of furnish used and the *p*H of that furnish. If the *p*H is on the acid side, the acid-precipitable compounds will remain on the felt for longer periods than if the furnish is alkaline.

Another method of felt preservation, and perhaps the one that is used most widely, is the effective use of slime-control agents. A judicious application of these agents effectively reduces the number of bacteria in the mill system, especially those which attack woolen fibers. If the bacterial content of the furnish is reduced to the point of no slime formation, increased felt life should result.

Various tanning treatments have also been suggested for the preservation of woolen felts. The value of such treatment is controversial. Some mills have reported satisfactory results with tanned felts, whereas others have reported that the treatment interferes with the normal functions of the felt.

If pretreated woolen felts are not normally used in the mill, the felt should be treated with a preservative during shutdown periods. For such treatment, there are several types of water-soluble compounds on the market. Any material which can be retained on the fiber, and which does not interfere with the normal functions of the fiber or the papermaking process, in general, can be used to increase felt life, especially during those seasons of the year when the furnish and the water supply contains large number of proteolytic bacteria.

How to handle chips with the continuous

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Consulting Engineer, Chicago

▶▶▶ THE CONTINUOUS FLOW or *en-masse* conveyor-elevator is one of the younger members of the materials handling family and its possibilities are less generally realized. In general it works in nicely for free-flowing granular or pulverized materials not actively abrasive or corrosive, and in the small or medium range of handling capacities—say up to 50 or 75 tons per hour. The power requirement is somewhat greater than for a flight conveyor and 50 per cent greater than for a bucket elevator of similar capacity, but power is a secondary consideration. Its advantages are that it is self-feeding to capacity, will not overload, and can do the job which otherwise requires two or even three units, at less initial cost. Properly applied it does a good job.

There are several standard machines available, all with the characteristic feature of closely spaced impellers within a closed duct, usually rectangular in section, so the material moves as a continuing mass. The speed is low, preferably not over 50 or 60 fpm, though it may be as high as 80 fpm for specific conditions. We will discuss typical applications for handling wood chips and follow with capacity and power data.

Figure 1 shows an installation at an Illinois roofing paper plant. The incoming chips are received in flat-floor gondola cars which are unloaded by grab bucket to reserve ground storage and re-handled as required to a feed hopper for transfer at 20 tph to the storage bin by a continuous flow conveyor. The feed is to the return run duct at the foot end, then drops into the lower or carrying run, and discharges successively to the first, second, and third outlets as the bin fills.

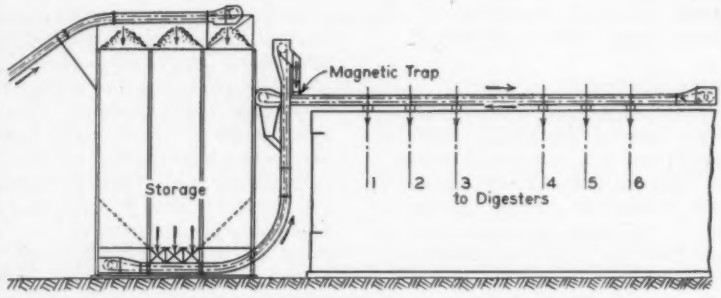


Fig. 1—Chip handling system feeding six digesters at roofing paper plant

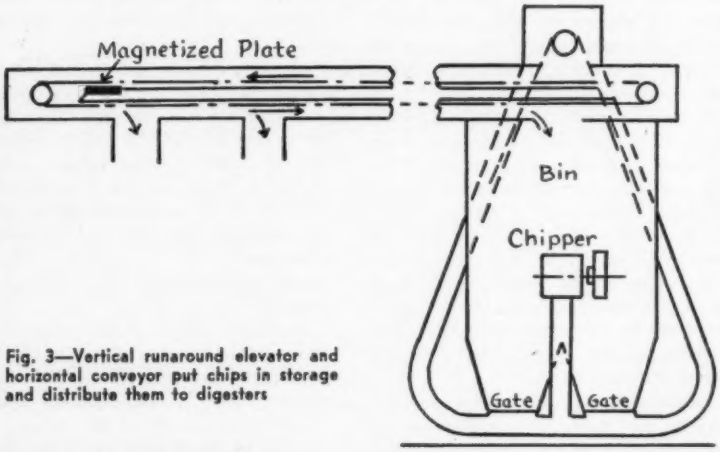


Fig. 3—Vertical runaround elevator and horizontal conveyor put chips in storage and distribute them to digesters

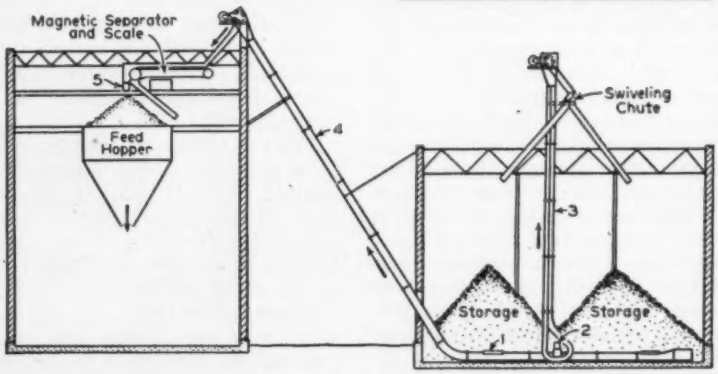


Fig. 2—Two continuous digesters are fed by this conveying system. Table below shows power requirements

Unit	Speed fpm	Installed motor	Motor hp by formula	Motor hp by test
Feeder	65	5 *	2.4	1.98 **
2	65	7½	4.74	4.79
3	83	3	2.35	2.28
4	70	7½	6.1	4.33
5	70	2	0.75	0.89

* Liberal allowance because of expected drag in feed from track hopper.
** Chips wet.

Filling continuous digesters

The job now is to fill, and keep filled, the vertical chutes feeding six continuously operating piston-type digesters or defibrators, each of which has a capacity varying from one to one and a half tph. One or more digesters may be out for servicing. Some of the unique features of the conveyor enter here. An L-path elevator at 40 fpm for a capacity of 10 tph feeds itself from the bin outlets to the capacity of the duct, and discharges over a magnetic separator to cull out stray bolts, etc., which might wreck or jam a defibrator.

The floor plate of the chute is mag-

flow conveyor

netized when the conveyor is started, and a trap door section just below is held closed. When the conveyor motor is stopped the trap door drops open and a few seconds later any fragments of metal that have been caught by the magnetized plate drop down and out. The tandem horizontal distributing conveyor carries outward in the upper run, and because only half the chips need to be carried beyond the third chute, a mid-length by-pass part way across the partition plate drops half the chips to the return run for feed chutes 3,2,1, while the remainder carries on and returns to feed chutes 6,5, and 4. The intermediate by-pass reduces the power requirement by about 50 per cent.

To insure that the feed chutes shall always be full, the capacity of 10 tph provides a surplus which is carried back into the return run of the elevator, automatically reducing the fresh feed from the storage bin.

One feature not so good is that this is practically a 24 hour per day operation, leaving little time for servicing. Figure 2 shows an installation at another Illinois paper manufacturing plant, better in this respect, since it maintains a ten hour supply of chips in a feed hopper above the two digesters. Chips in carload lots are discharged at a point 200 ft. from the plant into a 10 tph feeder from which the flow is across a vibrating screen to cull out slivers and blocks not readily digested by the defibrator. The 200 ft. conveyor rests upon wood sills on the ground and conveys in the top run for convenience.

In the reserve storage building, discharge may be to an inclined unit extending up to the top of the digester building where the material passes to a short belt equipped with Merrick scale and magnetic head pulley, and then to the conveyor serving the feed bin. When the bin is filled, conveyors 4 and 5 automatically stop and the discharge shifts to the vertical loop elevators to build up reserve storage. The reserve feeds to the horizontal run of conveyor 4 when needed.

The 200 ft. unit might have been a belt conveyor, which with housing and supports would cost far more. It might have been a screw conveyor, but that would mean concrete footings to assure maintained alignment. Vertical variations in alignment of a continuous flow conveyor are of no importance. They are very serious in a long screw conveyor. Finally, an alternate could have

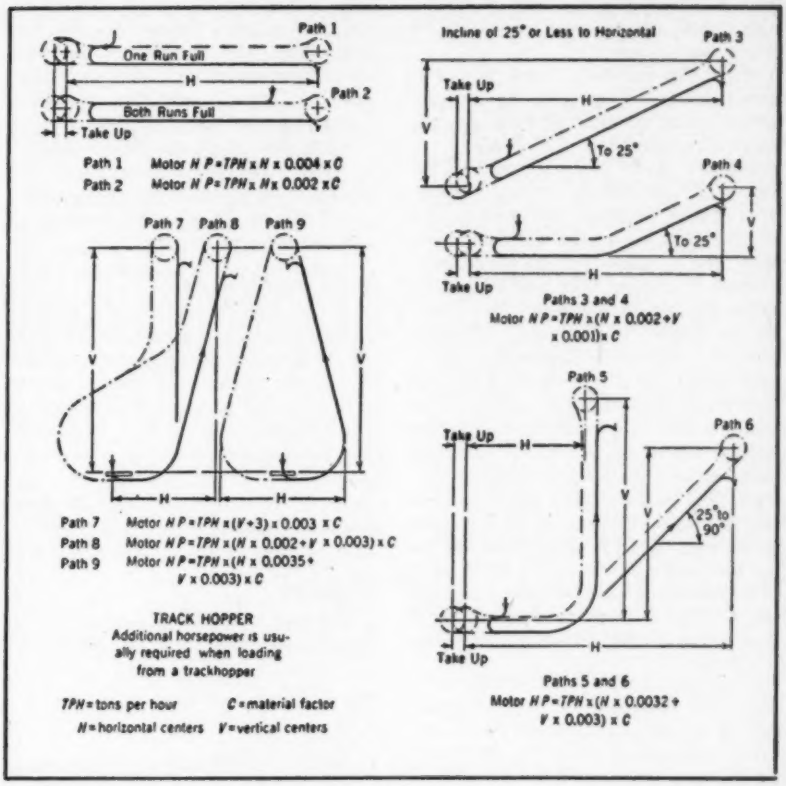

Path 1
One Run Full
H
Path 2
Both Runs Full
Take Up
Path 1 Motor H P = TPH x H x 0.004 x C
Path 2 Motor H P = TPH x H x 0.002 x C
Incline of 25° or Less to Horizontal
Path 3
Take Up
H
V
To 25°
Path 4
To 25°
V
Take Up
H
Paths 3 and 4
Motor H P = TPH x (H x 0.002 + V x 0.001) x C
Path 7
Path 8
Path 9
V
V
H
H
Path 7 Motor H P = TPH x (V + 3) x 0.003 x C
Path 8 Motor H P = TPH x (H x 0.002 + V x 0.003) x C
Path 9 Motor H P = TPH x (H x 0.0035 + V x 0.003) x C
TRACK HOPPER
Additional horsepower is usually required when loading from a trackhopper
Path 5
Take Up
H
Path 6
V
V
25° to 90°
Take Up
H
Paths 5 and 6
Motor H P = TPH x (H x 0.0032 + V x 0.003) x C
TPH = tons per hour
C = material factor
H = horizontal centers
V = vertical centers

Fig. 4—Formulas for determining the motor horsepower for different arrangements of continuous flow conveyors; the constant C for wood chips is 1.2 dry and 1.5 wet

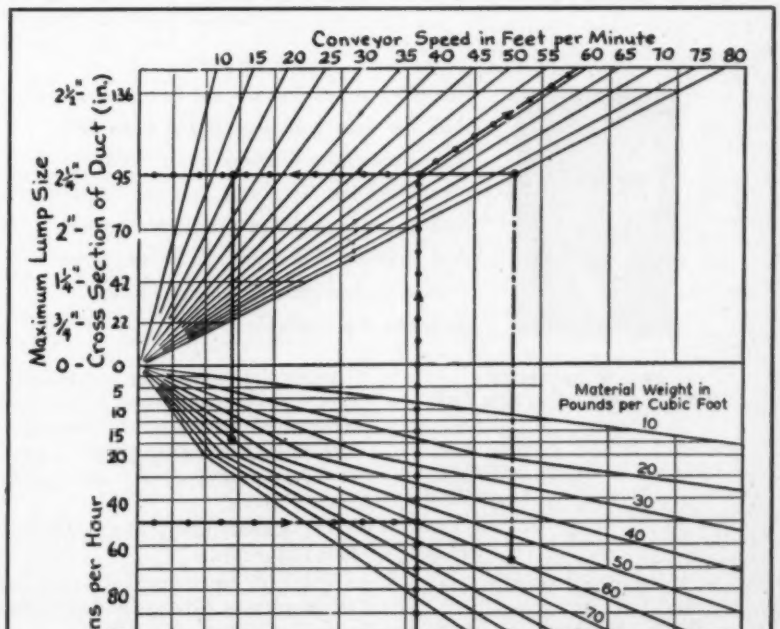


Fig. 5—Capacity chart for continuous flow conveyors

been a pneumatic system, not objectionable except that it would take about 15 times more power.

After the installation was put into service a test was made to see how the actual motor hp checked with the calculated requirements (See Table).

Figure 3 shows an interesting installation at a New Orleans wallboard plant. It is difficult to picture any combination of conveyors other than the continuous flow type so nicely fulfilling the requirements. A chipper, bin, and battery of defibrators are in sequence. The output of the chipper is at 45 tph. The consumption of the defibrators is slightly less than 15 tph. Two units, a vertical runaround elevator and a horizontal distributor suffice for handling to and from storage and to the feed chutes. The first unit encircles the bin and is driven by a two-speed motor. When handling from the chipper to the bin at 45 tph the speed is 66 fpm. When handling from the bin to the conveyor the speed is 33 fpm. The overhead conveyor has a capacity of 22 tph. It carries out in the upper run to the far end where the chips pass over a magnetized plate to the return run, any surplus falling into the bin. The output from the chipper may pass direct from elevator to conveyor, which takes its capacity and the rest spills down into the bin.

Subsequent plant operations called for a shift to chopped bagasse. The only change in the conveyors was to cut down the width of the impellers to increase side clearance in the duct.

Power requirements

In this type of conveyor the material is pulled along in contact with the walls of the duct and so the power is a function of the coefficient of friction in contact with steel plate. The constant C in the formulas which follow thus varies from 1 for such materials as graphite flakes, soap flakes, ground copra, and bran, up to 2.5 for heavy soda ash, lime, borax and ground cork. For wood chips, dry, C = 1. Wet, C = 1.5. (Figure 4)

Capacity

Capacity in tph for a given duct cross section and speed may be determined from the chart Figure 5. To illustrate its use, assume a material weighing 60 lb. per cu. ft. and a capacity of 50 tph. We enter the chart from the left at the 50 tph (Or from the bottom at the equivalent, 1600+cu. ft. hr.) and move horizontally to intersect the line for the wt. per cu. ft. Then move vertically to intersect a desirable speed line (60 fpm). Then horizontally to the left, where the marginal number gives the duct cross section, and also the largest lump size that size conveyor will handle safely. We find that for material with lumps not larger than about 2¼ in. we can use a conveyor with a duct cross section of 95 sq. in. If we wish to operate at a speed of 80 fpm and the lumps are 2 inches and under, we can use a duct size of 70 sq. in. Slow speed is best. Again if we have a conveyor with 95 sq. in. duct area, operating at 80 fpm, the capacity with material weighing 60 lb. per cu. ft. will be about 67 tph. Of course the engineer must ascertain from the manufacturer of the conveyor he selects, the maximum rated working load of the chain.

Forecasting Production Improves Operations

Too often executives do not have adequate tools for their guidance. It has been said that successful executives guess right 52 percent of the time, and that unsuccessful ones guess wrong that often. We believe that "batting averages" can be improved if more factual data on which to base decisions are available.

GEO. W. SALTFORD
Wallace Clark & Co., New York

The most difficult problem faced by any executive is that of foretelling the effects of demand on his operations. Projections are made for guidance and are usually designed to supply an answer from a specific point of view. Such reports do not lend themselves either to analysis or revision of detail.

The long-range planning methods described here have been used most successfully for executive direction. The relationship between customers' demands, material requirements, production facilities, and profits are apparent and the effects of changes can be directly evaluated.

Planning in some form should be the first function undertaken at any level of business. In general, planning is broken down into three phases:

(1) Management sets the general plan or policy.

(2) Manufacturing plans production based on orders.

(3) Each department executes its part of the plan as dictated by these orders.

Long-range planning for management should be based on the sales forecast, and then converted into terms of the physical facilities needed for production. Forecast data can be extended in two ways—in terms of direct material requirements and in terms of machine utilization.

Preparation of a financial plan based on forecast sales dollars, material costs and operating costs provides an appraisal for financial purposes. Management's first interest is in the financial appraisal —anticipated profits and whether or not expanded production facilities will require additional funds for operation or capital expenditure. This analysis may cause revision of the plan and reworking of details before acceptance.

The first steps in execution of the accepted plan are to make provision for contract purchases of basic materials, to review anticipated machine loading, and if necessary, to schedule the installation of production facilities. Subsequently, the efforts of the various departments must be co-ordinated and guidance provided to insure that the program is implemented according to plan.

Sales forecast

The sales forecast should be projected as far in advance as pulp requirements dictate. The forecast then should be revised and projected for an additional quarter one month in advance of the next quarter. The forecast data should be recapped in columnar listings of grade, finish, and tonnage. Manu-

facturing this uniformly will simplify correlation of different types of data for the same product.

In order that the sales forecast will be suitable for analysis, the grades specified must be broken down sufficiently to reflect individual furnish for material purposes, and finishing for machining purposes. In some instances a particular grade and finish may require deviations in furnish when run on different machines. This should appear as a separate subheading, even though the originators of the forecast are unable to prorate the amount to be run over that machine. For this reason it is desirable to calculate machine utilization first and allocate the tonnages requiring special formulae before calculating material requirements.

Machine utilization

In the machine loading forecast illustrated in Figure 1, sales tonnages should be converted into "Pounds to Make Over Machine," by adding an allowance for finishing broke in each case. This permits direct use of production rates, which already include allowances for anticipated machine broke.

The calculation should be made by the person in charge of scheduling production, in order to take advantage of his experience.

Experience comes into play in allocating the production to specific machines. Larger runs are allocated to larger machines and smaller ones to the smaller machines, so that change-over costs will not be disproportionate. The sizes of some grades permit more economical widths to be run on certain machines. There are also instances where the desired quality of a particular grade is best produced on a specific machine.

After the initial allocation of an item to a machine, the average basis weight is applied to determine the production rate in pounds per hour. The number of machine hours then becomes a matter of dividing "Pounds to Make" by "Pounds per Hour."

The total available hours for each machine are found by deducting allowances for holidays, maintenance and changeoffs from the total for the quarter. The number of hours allocated to each is then related to the total hours available for that machine, and the original allocations are adjusted to that end. Usually the first attempt at allocating grades to machines will need revisions before final summarization.

Material requirements

Two factors, frequently not considered, should be included in the calculations of material requirements. The broke produced is generally reabsorbed during manufacture. If each grade utilized as much as it produced, this factor could be disregarded. But, superior grades produce more than they absorb and inferior grades the opposite. Therefore, relatively more furnish is required for superior grades and less for the inferior ones. For this reason, broke must be included in the calculation.

Although an analysis of the effect of fillers and sizes proved that these averaged some 9 percent of the finished product, and some 7 percent of the fibrous content was lost, these averages cannot be applied to all grades. Grades checked varied from an input of 100 pounds of fibrous furnish plus two pounds of fillers, to produce 93 pounds of paper, to an input of 100 pounds of fibrous furnish plus 30 pounds of filler to produce 112 pounds of paper. Also, some 30 percent of the filler was lost in comparison with 7 percent of the fibrous furnish.

The furnish formulae, in percentages, are derived from those specified in pounds by first finding the output, in pounds. This is the sum of two adjusted sub-totals (total fillers less 30 percent) plus (total fibers less 7 percent). For each formula's components, each figure is divided by the output. The sum of these component percentages should equal the input-output ratio, expressed as a percentage. This is derived by dividing the total number of pounds going into a batch by the output, in pounds.

In forecasting material requirements, as illustrated in Figure 2, the net tonnage is first increased by the total dry machine and finishing broke anticipated. Wet broke is omitted as it is reused. The tonnage of each material item for each grade is the specified percentage of the tons to make. Columnar addition provides the total requirements for each furnish item.

Financial planning

Once material and machine requirements are established, accurate financial planning is possible. Manufacturing costs, including overhead, can be computed from material costs and running rates for the machines. Forecast *sales*, less *costs*, foretell *profit*. Consideration of anticipated profit, when related to existing financial position, provides the foundation for executive decisions which constitute the *plan* for the future. Periodic amendment of the plan to meet business trends will improve your executive batting average.

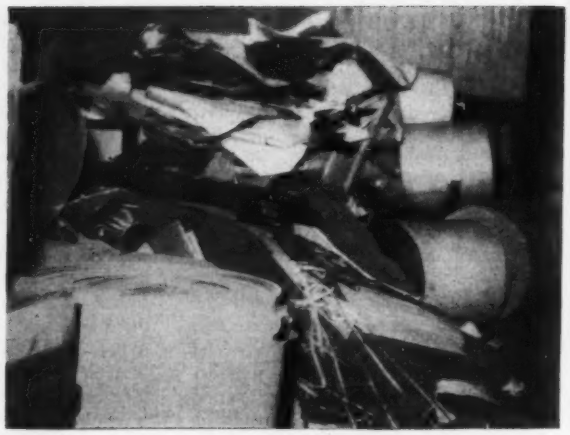
GRADE TYPE	FORECAST: NET TONNAGE	FORECAST: % FINISHING BROKE	FORECAST: TONS TO MAKE	FORECAST OF MACHINE UTILIZATION — QUARTER 19__: MACHINE #1: TO MAKE	MACHINE #1: ST.	MACHINE #1: F'SH'G	MACHINE #1: HRS	MACHINE #2: TO MAKE	MACHINE #2: ST.	MACHINE #2: F'SH'G	MACHINE #2: HRS	MACHINE #3: TO MAKE	MACHINE #3: ST.	MACHINE #3: F'SH'G	MACHINE #3: HRS
1	9875	7.2	10275	9948800			1378	2858300			668	1408400			1068
2	1250	9.1	1787	1150000			84	2758400			836	870000			858
3	800	10.1	880	980000			108					880000			196
4	845	6.2	1002.5	888400	16	5730	68	1440000	18	4880	888	48800	80	1470	88
5	725	8	785					1868000	84	5810	884				
6	50	8	54									108000	70	1280	84
7	125	5	171.8					888400	60	5290	48				
8	75	8	81												
9	150	8	162	224000	48	4170	78								
10	800	8	816									1500000	75	1340	118
11	885	5	881.8					1108400	98	6280	178				
12	125	5	171.8					888400	60	5200	60				
13	50	5	52.5					108000	18	4885	88				
14	75	8	81												
TOTAL UTILIZATION	14800	7.8	15884.6	11708800			1884	9727800			1878	8284400			1844
AVAILABILITY							10				8				0
CAPACITY							1844				1844				1844
ALLOWANCE							284				284				284
TOTAL							2808				2808				2808

Fig. 1—Machine loading forecast

GRADE TYPE	FORECAST: NET TONNAGE	FORECAST: % DRY BROKE	FORECAST: TONS TO MAKE	DRY BROKE: %	DRY BROKE: TONS	WET BROKE: %	WET BROKE: TONS	FILLERS: %	FILLERS: TONS	FIBER: %	FIBER: TONS	CLAY: %	CLAY: TONS	STARCH: %	STARCH: TONS	INPUT OUTPUT RATIO %
1	9875	17.6	11278		18		1648		1941		6782		61		1615	
2	1250	84	1587		205				105						654	
3	500	84	620		112				68						140	
4	945	22	1157	19.8	229			11.8	126					21.4	261	110.5
5	725	20	870	14.8	180			11.8	102	27.9	806			21.8	190	110.5
6	50	20	60			18.5	10	16.2	10	56.8	74					111.7
7	125	25	156			18.4	29	24.4	38	27.7	42			18.0	28	119.8
8	75	24	93			17.7	16	6.0	6	68.8	66	0.2	9	12.8	12	109.0
9	150	20	180	19.8	74			14.9	27	16.1	29			29.9	54	111.8
10	800	20	240	22.8	56			8.9	21					53.0	127	109.7
11	885	10	977	17.0	98			7.8	42	18.1	104			58.6	185	109.8
12	125	20	150	10.8	15			7.5	10	8.5	12			82.5	98	109.4
13	50	25	62	26.1	16			4.8	3	24.7	88					108.6
14	75	25	94	11.4	11			8.7	8	47.8	45			42.9	41	108.9
TOTAL	14800	18.8	17280		1082		1847				8479		70		2257	111.1

Fig. 2—Material requirements forecast

This WAS a roll of paper before damage

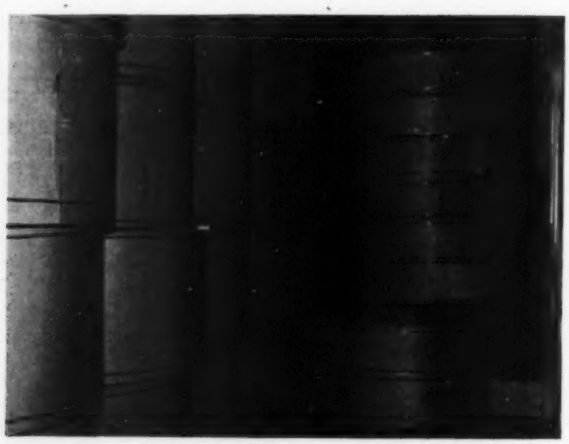


Eight years of this cost $11,000,000

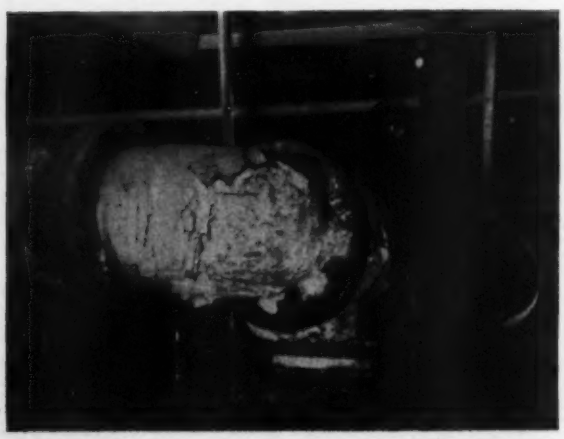
It can be done . . . . .

Ohio Boxboard runs successful campaign to

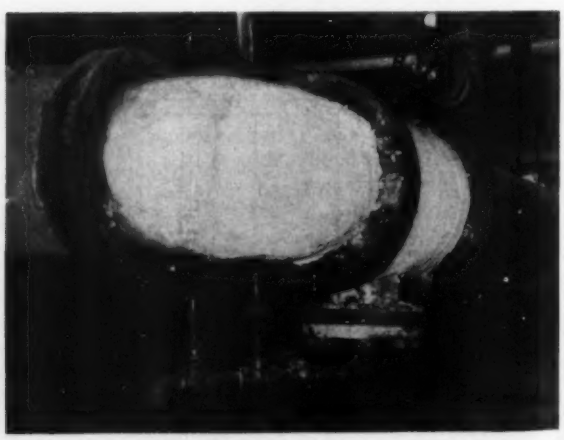
Sloppy stacking leads to waste



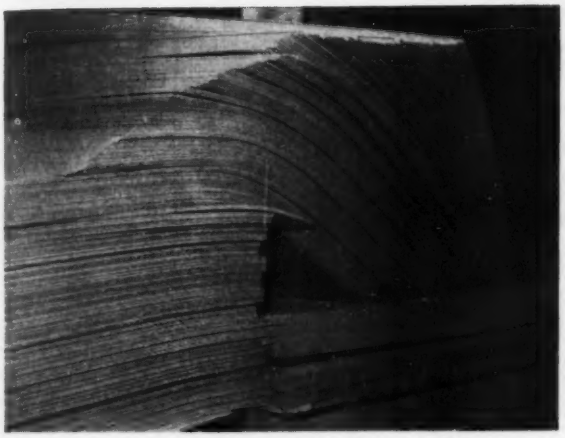
Rolls don't damage easily when piled carefully



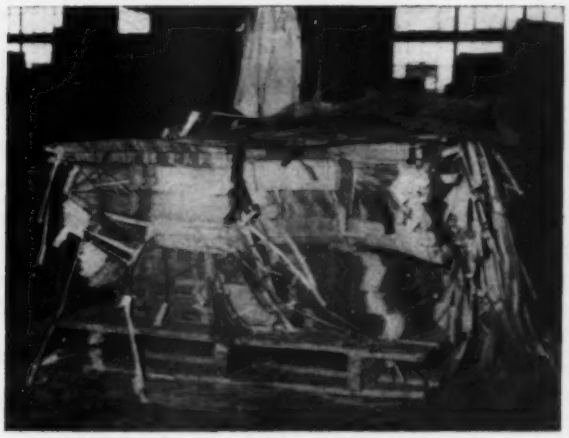
Leaking pipeline wastes steam—it got attention



Waste prevented, good maintenance promoted



It takes man-hours to save these sheets



Poorly cut carton blanks are hard to save

STOP WASTE!

▸▸▸ BEGINNING EARLY in 1950, top management at The Ohio Boxboard Co., Rittman, Ohio, planned and put into effect a really workable campaign against material waste. The need for wast reduction was proved by a preliminary study, which showed that over a period of eight years, the total cost of material waste had been the staggering sum of $11,000,000. The effect of the work done so far by waste reduction measures has been to reduce the waste figure for the year 1950 by $200,000, with the ultimate goal a saving of $732,000 per year.

This was no two-week pep drive, but a steady, sensible campaign sparked by informed leadership and continued publicity to achieve long-range goals. Actually, the campaign is part of a thorough over-all cost reduction program which has been operating for about five years.

The most important part of the program was the development of *waste standards* against which operating results would be measured. These were the basis of the program, since they provided a realistic measuring stick for all activity. Fair allowable waste was determined for each piece of equipment and operation. Operating records for each month showed how close the percentage of waste came to the standards. Favorable publicity was given to those departments which kept waste below the agreed-to standards. Standards themselves will be reviewed annually to adjust for any inequities.

Objectives

This was how the problem was approached: A committee chairman, R. C. Sterley, chief industrial engineer, was appointed by top management, along with members representing each major department of the company. This Coordinating Committee then established objectives for the waste reduction program. They were: (1) standards had to be developed for all major and minor pieces of equipment and operations; (2) problems and ideas arising from the waste reduction program were to be brought to the attention of the committee; (3) publicity was to be developed; and finally, (4) reports on results were to be made to management.

Publicity

After standards had been developed and agreed to by department foremen and managers, the problem of publicity was attacked. The house organ, "In the Box," proved to be an ideal medium, and its size was increased by 50 per cent to allow for feature articles on waste problems and their solution. Photographs were used liberally to show before-and-after views of material waste and destruction. High points came when, after several months of effort, individual departments were written up for 100 per cent or better operation without excess waste.

Other forms of publicity were a slogan contest and the placing of bulletin boards throughout the plant to show the results and causes of waste. Displays of waste from operations were exhibited on bulletin boards and posters. Orderly stacking and storing of materials and finished products were stressed. An office campaign was directed toward elimination of wasted time, effort and supplies.

The biggest publicity stunt was a "No Waste Day" campaign, held when the program was well under way. On this day three waves of inspection committees inspected the plant for good housekeeping, good workmanship and careful materials handling. The committees consisted of foremen, division superintendents and officers of the company. The last group rated the departments and filled out cards asking explanations of specific instances of violation which they found. These cards were answered by the foreman, passed to the superintendents, and finally forwarded to the production manager. To point up the occasion, each employee and visitor wore a paper cap imprinted with "Stop Waste."

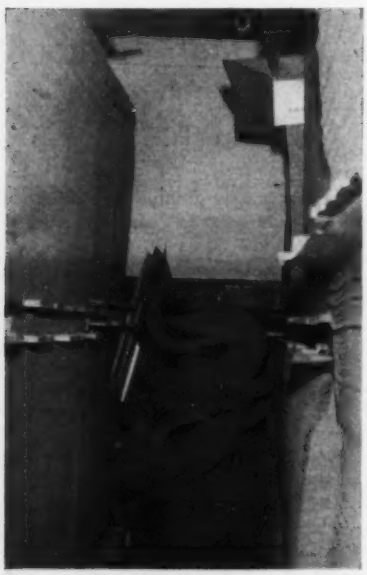
Progress reports

Reporting progress of the program to management was done through weekly performance charts and weekly excess waste charts expressed in dollars. These were distributed as they were compiled, and at the end of the year a master chart for 1950 was made up to show over-all progress. In addition, management meetings were held to show slides giving data and pictures of concrete examples of achievement. These, together with the measures carried out on "No Waste Day," gave the Coordinating Committee and management a chance to evaluate results and check the progress of the work they were doing.

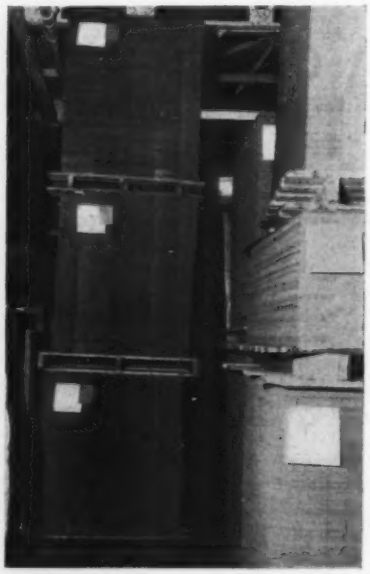
Responsibilities

The seriousness of the effort made was responsible for the long-haul results of this campaign. As far as possible, each department was asked to contribute the

Posters like this called attention to cost of waste at Ohio Boxboard



Call the rescue squad



Careful piling costs less

services they normally provided to the organization. The whole campaign was keyed to the belief that waste prevention is a permanent management responsibility, with the campaign merely an extra effort to solve an especially serious problem.

By defining the objectives to be attained and dividing the responsibility for them realistically, a really all-out program was achieved. Here are the responsibilities, as defined by the committee chairman:

Sales Department: Provide posters and displays from art department; give examples of rejects from customers; make special studies of quality; expedite proposed manufacturing changes which affect the customer.

Accounting Department: Provide operating division and committee with performance results; establish cost variations of the value of excess waste; evaluate savings of proposed changes; make recommendations as to clerical changes.

Industrial Relations Department: Provide publicity through house organ, bulletin boards and management meetings; reflect employee attitudes toward waste reduction; recommend measures to be taken to overcome human relations attitudes.

Purchasing Department: Provide cost of raw materials, equipment and supplies; make recommendations for economy; co-ordinate suggestions received regarding the more efficient procurement of materials; recommend the availability of substitutes.

Quality Control Department: Bring examples of manufacturing waste to the committee; make recommendations as to the conservation of raw materials; supply the committee with samples of in-process waste.

Shipping Department: Provide committee with cost of damaged goods as a result of warehousing and shipping; provide committee with list of materials which had not been shipped within 30 days; make recommendations as to improved scheduling.

Maintenance and Engineering Department: Make recommendations for improved mechanical methods resulting in decreased waste; provide services of carpenters, tinsmiths, electricians, etc.

End results

Late in 1950, and in the early months of 1951, the success of the effort began to show. The house organ printed the records of several departments that had kept waste records to 100 per cent or better—that is, at less than the waste standard set for those operations. For example, allowable waste in the Carton Division was set at 4.4 per cent. In January, 1951 this division operated at 4.06 per cent waste, or 0.34 per cent under the standard. The cash saving amounted to $8,819.

Now at mid year of 1951, the performance record as reported by "In the Box" has continued to improve. Since the beginning of the year, No. 1 Paper Machine has been operating with 23 percentage points improvement as compared with the same period in 1950.

No. 2 Paper Machine crew has increased its performance from 80 to 90 per cent—an increase of 10 points. No. 3 Paper Machine went from a 72 performance last year to an 85 per cent performance in 1951—an increase of 13 points. No. 4 Paper Machine increased its performance from 70 to 100 per cent, —30 points increase.

The Carton Division advanced from a 73 performance last year to the 105 per cent mark for the same period in 1951. At the same time, the Container Division improved its position from 79 per cent in 1950 to 95 per cent in 1951. An over all performance for the whole plant went from 74 per cent to 104 per cent.

One of the most important factors in the success of the waste reduction program was the wide participation by all employees, from top management to common labor. Having saved over $200,000 in 1950, the company hopes to continue to increase this saving substantially in 1951.

Acknowledgement

Acknowledgement is made to R. G. Sterley of The Ohio Boxboard Co. for his help and cooperation in the preparation of this article and for supplying the photographs used herein. The article is based on material appearing in the O.B.C. publication "In the Box" and on a paper given by Mr. Sterley before the Lake Erie Papermakers and Converters Association.

Centrifugal Pumps . . .

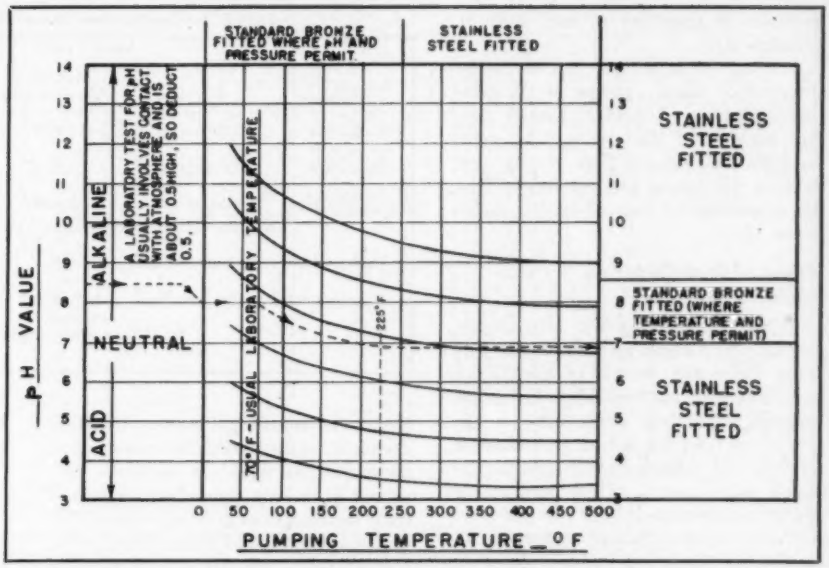

STANDARD BRONZE FITTED WHERE pH AND PRESSURE PERMIT
STAINLESS STEEL FITTED
STAINLESS STEEL FITTED
STANDARD BRONZE FITTED (WHERE TEMPERATURE AND PRESSURE PERMIT)
STAINLESS STEEL FITTED
ALKALINE
NEUTRAL
ACID
A LABORATORY TEST FOR pH USUALLY INVOLVES CONTACT WITH ATMOSPHERE AND IS ABOUT 0.5 HIGH, SO DEDUCT 0.5.
70°F - USUAL LABORATORY TEMPERATURE
225°F
pH VALUE
PUMPING TEMPERATURE — °F
0 50 100 150 200 250 300 350 400 450 500
14 13 12 11 10 9 8 7 6 5 4 3

Figure 1—Pump construction material recommendations based on *p*H

Part 15 of a series . . . Construction materials—II

IGOR J. KARASSIK and ROY CARTER
Application Engineers
Worthington Pump & Machinery Corp.

Rate of corrosion of pump parts is affected by the acidity or alkalinity of the liquid being pumped.

Hydrogen ion concentration

The *p*H value of a liquid is a quantitative representation of the relative acidity or alkalinity of this liquid. It is based on the concentration of H + (Hydrogen) ions as opposed to OH − (Hydroxyl) ions in the solution. The *p*H scale is a logarithmic scale, calculated from

$$pH = 1/H + \text{concentration}$$

and as such, the lower the *p*H, the more acid the solution.

A solution having a *p*H of 7.0 is neutral, *p*H values above 7.0 indicating alkalinity and *p*H values below 7.0 indicating acidity. Since the *p*H value is expressed in a logarithmic scale, it must be remembered that changes in *p*H represent more than a direct linear change. For instance, a solution having a *p*H of 5.0 is ten times as acid as one having a *p*H of 6.0.

The *p*H of a given solution varies somewhat with temperature changes, decreasing rather rapidly up to 300 F. and remaining fairly constant above that. For instance, a solution with a *p*H of 8.5 at 70 F. will have a *p*H of about 7.0 at 300 F. and 6.8 at 500 F. (See Figure 1)

While *p*H is not the only factor influencing the selection of materials of pump parts, it may be stated that standard bronze fitted pumps should not be used for *p*H values below 6.00 or above 8.5 at the pumping temperature. Below 6.00, all bronze pumps or stainless steel fitted pumps should be used, while above 8.5, the pumps should be all iron or stainless steel fitted.

Galvanic corrosion

When two dissimilar metals are used in close proximity, in a pump handling a liquid which is an electrolyte, severe corrosion may be expected to occur due to the galvanic cell action between the two metals.

Galvanic corrosion is a rapid corrosion of a metal which occurs when the metal is electrically connected to a dissimilar metal in corrosive conditions. The combination of the two metals connected with each other and immersed in an electrolytic solution is the simplest form of an electric battery cell. The electrochemical reaction set up under those conditions causes electric current and small metal particles to flow from one metal to the other. These particles may become deposited on the second metal or else be washed away, due to the flow velocities in a centrifugal pump. The protected metal is the cathode and the corroded end is the anode of the two-metal cell.

If metals are arranged in the order of their relative tendency to corrode through galvanic action, the resulting tabulation is termed a "galvanic series."

The galvanic series as tabulated in Figure 2 gives an approximate idea of the interrelation of metals most commonly used in centrifugal pump construction. It does not include the various stainless steels used for pump parts as the position of these alloys in the series cannot be definitely fixed and has been known to change depending on the exact nature of the electrolyte. It is safe to state, however, that with weak electrolytes, they will occupy a position in the iron and chrome iron group and that the galvanic action between these materials is almost negligible.

The relative position of the listed metals is subject to some changes. However, changes across the spaces left blank between adjoining groups of metals are unusual.

Effect of structural features on choice of materials

While in many cases, the choice of materials can be made mainly from the point of view of corrosion and abrasion resistance, the structural features of a given pump part may play a definite role in the final material selection. Some parts, for instance, may require extremely thin wall sections and a material such as cast iron would prove to be unsuitable for these parts, even though it may be suitable from the point of view of corrosion. Other parts, such as shaft sleeves, require a high degree of polish and only materials which are capable of receiving such finish can be used for these parts.

Wherever the structural design features require the use of pressed-on or shrunk-on parts, the material used for these parts must be suitable for this method of mounting. For instance, when pump impellers have to be shrunk on the shaft, bronze cannot be used and the

Material from this article will be included in a book on centrifugal pumps now being prepared by the authors; hence, all right to republication are reserved by the authors.

selection is restricted to cast steel or stainless steel.

One of the important factors in the strength of metal castings is the relative uniformity of cross-sections of various portions of the casting. The more uniform these cross-sections, the stronger will be the casting and the less will be the possibility of internal cracks, inclusions, etc.

Effect of load factor on choice of materials

It is obvious that the selection of metals which would give the longest possible life for a temporary installation would be very uneconomical. Thus, frequently a standard fitted pump is applied on a service where corrosion or erosion will wear the pump out in relatively short time, since the need of the pump is shorter than its life on the service. The same reasoning applies to installations where the pump is operated an extremely small percentage of the time, as long as contact with the liquid pumped during the idle periods does not continue the disintegration process or as long as the pump can be drained and flushed out.

On the other hand, where outstanding reliability is desired, the best materials are none too good, even if a pump is to operate but once in ten years. The best example of this statement is that of the pumps used in the U.S. Navy. While operation of the centrifugal pumps on board ship is relatively infrequent in peacetime and not all the equipment installed is operated constantly even in war time, the most rigid specifications as regards materials are enforced by the Navy since failure of any part of the equipment may prove disastrous. The same considerations apply to pumps used on fire service, where dependability is of paramount importance.

There are two fields in which metallurgical advances have had a marked effect on the centrifugal pump design. These are the pumpage of chemicals and boiler feed water. The selection of materials for centrifugal pumps handling chemicals is naturally dependent upon the particular liquid in question. This service is a very specialized field and those interested can generally obtain very detailed information from those pump manufacturers who are actively engaged in the production of chemical pumps.

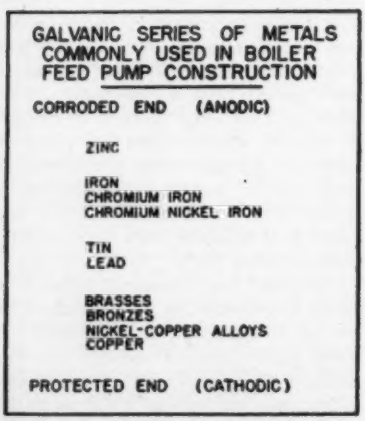


Figure 2—Galvanic series

TABLE 2—Construction Materials for Boiler Feed Pumps

Casing	Fittings	Maximum Temperature	Use
Cast Iron	Bronze	250 F.	*p*H neutral to 8.5, unless water is known to have corrosive action
Cast Iron	Stainless Steel	350 F.	Any *p*H, unless water is known to have excessive corrosive action
Carbon Steel	Bronze	250 F.	Seldom used for boiler feed service today, and only where water is definitely known *not* to be corrosive
Carbon Steel	Stainless Steel	400 F.	*p*H above 8.5, unless water is known to have corrosive action
Stainless Steel	Stainless Steel	Any temp. normally encountered	Any *p*H and where water is corrosive or previous trouble reported

Effects of metallurgical advances on selection of pump materials

Boiler feed pumps present a more general interest and as the selection of materials for this type of pump has been the most affected of all the general classes of centrifugal pumps by recent metallurgical developments, it may be interesting to discuss the present trend in boiler feed pump material selection.

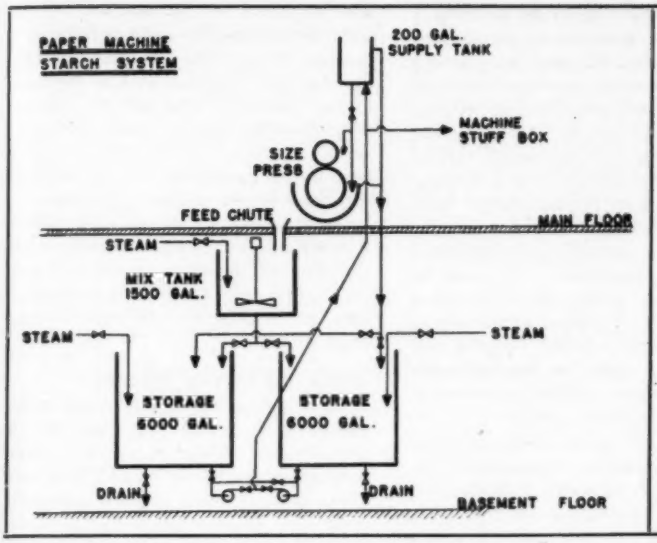
Most boiler feed pumps designed for pressures of 800 psi and above are now stainless steel fitted, regardless of temperature or feedwater analysis. The application of stainless steel fittings—impellers, wearing rings, sleeves, etc.—shows signs of extending to even lower pressures. Today, it is almost mandatory under all pressure conditions for temperatures over 250 F. and for all installations where the feedwater *p*H is either below 7.0 (neutral) or over 8.5.

Recent developments indicate that in addition to the use of stainless steels for the internal parts of centrifugal boiler feed pumps, stainless steel casings will be utilized to a much greater extent than heretofore. A definite impetus in this direction has been given by the findings of an investigation conducted by the Boiler Auxiliary Sub-Committee of the Prime Movers Committee of the Edison Electric Institute. This investigation was initiated to determine the cause of the rapid pump deterioration being experienced in many of the higher pressure power plants, a condition which had reached alarming proportions in the early forties. Among the various findings made by this sub-committee was the fact that stainless steels, 13 per cent chromium and better, are immune to the attack of any boiler feedwater so far encountered. The 5 per cent chromium 0.5 per cent molybdenum steel is apparently also immune.

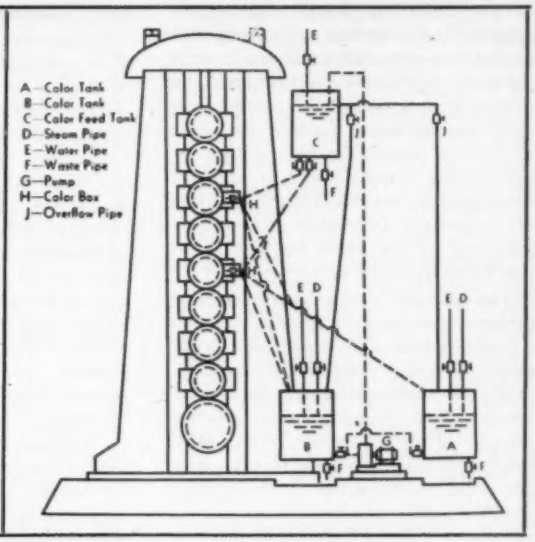
Table 2 has been prepared as a general guide for the selection of boiler feed pump materials. It goes without saying that it represents an average of the recommendations in use today and is subject to some modifications.

The possible range of selection of corrosion-resistant stainless steels is wide and includes both the straight chromium steels and the so-called austenitic, chrominum-nickel steels. In the former type, the chromium content may be at the 5, 9 or 13 per cent level; in the latter case, the composition range may extend from the familiar 18 per cent chromium, 8 per cent nickel type to the higher 25 per cent chromium, 20 per cent nickel type (adopted by the U.S. Navy for all boiler feed pump service). The final selection, in any case, depends both on the details of design and the operating conditions. It is important to remember, however, that the austenitic steels have a coefficient of expansion approaching that of bronze and 50 per cent greater than that of carbon steel or of the lower chromium level steels. If the design of the boiler feed pump is such that this difference in co-efficient of expansion may lead to operational difficulties, the use of 18-8 steel or other austenitic steel is not recommended.

In part, there exists a certain tendency to select the stainless steel for the pump casing from the point of view of its weldability. While it is true that some stainless steels are more readily welded than others, it is necessary to remember that their use in itself practically eliminates any possibility of the need for field welding. However, even the 5 per cent chromium alloy can be practically welded in the field. It must be heated to approximately 400 F. prior to welding, heated to about 1200-1300 F. for stress relieving and not permitted to cool quickly and air harden. Similarly, 13 per cent chromium steel should be heated after welding to about 1300 F. and 18-8 stainless to 900 F. for complete stress relieving. Of course, if the weld is small, stress relieving is not necessary.



Size press system for applying starch to paper (Fig. 12)



Calender application of starch size (Fig. 13)

Potato starch in papermaking processes

Part II of a survey on the use and performance of potato starch in paper and paperboard. Part I, which appeared in The Paper Industry last month, classified and compared the different types of starches and discussed the beater application of starch. Part II goes further and outlines the use of starches in surface sizing of paper and discusses its use as an adhesive.

EDWARD E. STEPHENSON, JR.*

Sizing the partly dried web of paper in the drier section of the paper machine, either by immersion of the web in a bath of starch solution, or by surface application with starch showers on a size press, is referred to as tub sizing. A typical installation of this type of system is shown in the flow sheet in Figure 12.

The tub sizing process

This process is one of the major applications of starches in the paper industry. The tub sizing operation is primarily a treatment designed to prepare the surface of the sheet of paper for inks, either writing or printing, although low viscosity grades of starch used in this application develop enough penetration into the body of the sheet to increase desirable strength characteristics.

Tub sizing with properly modified starches can increase the bursting strength folding endurance, and tensile strength of a sheet by appreciable quantities. Strasser *(15)*, in laboratory tub sizing runs on 100 per cent rag stock, was able to show an increase in Mullen of 51.18 per cent after starch sizing. He also found increases of 158.7 per cent in folding endurance, 16 per cent in tensile strength, and 80 per cent in the stretch of the samples tested. Oxidized starches were used in obtaining these results. Although these are laboratory results, produced under favorable conditions, these figures justify Casey's *(9)* statement that there is a trend in starch usage away from the beater and towards the tub where 100 per cent retention is obtained.

In addition to the quality factors mentioned above, it is possible to develop an impressive rattle by means of the tub sizing process.

For grades of writing paper where the penetration effects mentioned above are unimportant and only a relatively small amount of starch per unit of area is required, unmodified or slightly modified starches may be used in tub sizing. In this manner, the starch is kept mainly on the surface of the sheet being treated with a minimum of penetration and a maximum of economy in operation. With even this light treatment, marked reduction or elimination of printing pick as well as pen and ink feathering can be obtained.

The degree of penetration in tub sizing and, hence, the degree of sizing, is mainly controlled by the porosity of the sheet, the surface tension as well as viscosity of the starch suspension, and the pressure on the size press. Since the usable concentration of the sizing solution depends largely upon the viscosity characteristics of the starch used, the starch manufacturer controls some of the variables in this operation, unless conversion of the starch is carried out in the paper mill by an enzyme hydrolysis. In that case, the paper maker can select his viscosity and concentration from a wide range. The temperature range commonly encountered in tub sizing is from 120 to 145 F., with concentrations measuring from 0.5 to 6.0 deg. Bé.

As a guide to sizing, the theoretical relationship of the factors previously mentioned has been expressed mathematically by Cobb *(21)*, *(23)*, *(24)*, in the following sizing formula which shows the variables with respect to depth of penetration of the sizing mixture:

$$l^2 = (r\,\sigma\,\mathrm{Cos}\theta\,t)/2\,\mu$$

where: l equals depth of penetration in centimeters
r equals paper pore radius in centimeters
σ equals surface tension in dynes per centimeter
θ equals the angle taken by the liquid in contact with a solid
t equals the time of penetration in seconds
μ equals the viscosity of the solution in poises

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The practical papermaker has at his disposal the following possibilities to control the penetration of starch into the sheet: the porosity of the sheet; the surface tension of the sizing suspension (with surface active agents); the angle of contact (which can be governed by the quantity of rosin size, wax size, and alum used in internal sizing); the time of penetration (which is governed by the speed of the paper machine), and the viscosity of the sizing agent.

The viscosity of the sizing agent is perhaps the most important of the variables which are controllable. It depends upon the type of starch used, the degree of conversion, if any, the concentration of the sizing solution, and the temperature of application. Thus, there are ample variables available to keep the sizing agent on top of the sheet or to drive it into the sheet if so desired.

Sizing at the calender stack

Application of starch to one or both sides of a sheet by allowing a starch solution to flow from water boxes onto the calender rolls of a wet calender stack is known as calender sizing. A drawing of a typical installation for calender sizing is shown in Figure 13.

Although calender sizing is mainly a surface treatment, Casey reports that bursting strength has been improved by a measurable amount following the use of highly modified starches in high concentration.

Calender sizing is often used to close the surface of a sheet resulting in reduced absorption of the vehicle in gloss printing inks. Additional advantages are gained in that this sizing treatment tends to set the surface fuzz of the finished sheet and enhances the smoothness of the sheet. A limited scuff resistance may be built up resulting in an improvement in the erasability of the sheet.

Starches for calender sizing are often highly modified and concentrations of one and a half to two pounds of modified starch per gallon are not uncommon. Grades of board which require only a limited pick up of starch may be sized at the calenders with suspensions of cooked native starch.

Additives

Additives used in calender sizing are numerous. Zinc stearate and calcium stearate dispersions are said to further improve the printing surface of calender sized board. Wax emulsions may be added to remedy picking of the calenders. Sodium alginate may be blended with starch to increase the surface resistance to the penetration of ink or paraffin waxes. Water soluble cellulose compounds such as methyl cellulose, carboxy methyl cellulose, and hydroxy ethyl cellulose may also be blended with starch for the same purpose.

Surface sizing for gloss ink printing

In calender application, preparation of a good surface for gloss ink printing is often a primary consideration, and surface conditions important in printing should be considered. Vallandigham *(25), (26),* lists oil absorption, formation, smoothness, and resistance to picking as the major surface factors governing printability. In this classification he includes compressibility and softness as a part of smoothness. To a certain degree, surface sizing affects all these factors with the exception of formation, which, according to Jayne, Tongren, and Jackson *(11),* may be decidedly improved by proper addition of starch at the headbox or in the beater.

Chapman *(27)* in his work on correlating the Canadian Association's test for surface oil resistance with the performance of actual gloss ink press runs, indicates that oil absorption is, within reasonable limits, the major factor in producing paper or paperboard suitable for best results in gloss ink printing.

Measurement of the property of oil absorption was proposed by Vallandigham as a means for evaluation of the ability of a sheet to reproduce well when gloss inks are used. The testing device he proposed consists of a means for applying a standard film of U.S.P. Heavy White Mineral Oil to the surface to be evaluated. A light beam is focused on this film in such a manner that the angle of incidence is 22 deg. The reflected light beam is then intercepted by a photoelectric cell and the rate of decrease in intensity of the reflected light beam is plotted as a measure of the rate of oil absorption of the sheet.

A modification of this test, developed independently by the Technical Section of the Canadian Pulp and Paper Association and reported by Chapman *(27),* also proposes use of an oil film. The gloss of the base stock is determined on a standard gloss meter. An oil film is applied and its gloss is measured. The end point is reached when penetration into the sheet has reduced the gloss of the oil film to a value which represents the arithmetic mean between the two initial gloss readings. Results are reported as the number of seconds required to reach the end point.

Ink vehicle penetration

The theoretical approach to gloss ink work is well covered by Voet and Brand *(28)* in their work on the speed of penetration of printing ink. They show that on a given paper, the vehicle of the ink is the governing factor in penetration and that complex, but homogeneous liquids penetrate as a single fluid mainly into the capillary interstices between the paper fibers.

Therefore, one excellent means of holding the fluid vehicle of gloss inks and varnishes on the surface of the sheet is the deposition of a film at the calender stack. This film must be clear, flexible, and tough, as well as resistant to the commonly used vehicles. Other requirements, from a practical viewpoint, are that the film-forming agent must be easily prepared to meet standard specifications in actual mill practice, and that the cost of the agent be held to a reasonable minimum, consistent with the price of the furnish used and the grade produced. Starch, a natural polymer, comes close to fulfilling all these requirements.

Starch as a coating adhesive

As an adhesive in coating compounds, starch plays another important role in papermaking. Here starch must meet basic requirements outlined by Bingham *(29),* such as: high adhesive strength, good flow characteristics with a minimum of retrogradation, good color, and good colloidal protective action. A balance with possible sacrifice of maximum effectiveness in one or more requirements may be dictated by the method of application, by machine speed, type of pigments, or other factors controlled by actual production conditions.

Coating starches used as the sole binder are unsuitable for producing offset grades with good wet-rub characteristics; however, recent work thoroughly reported in the TAPPI Monograph edited by Bingham *(29)* has shown that there are many approaches to the problem of water resistant starch coatings. Furthermore, Frisch, Cushing, and Gussman *(30)* have shown that a starch coating having 95 per cent of the water resistance of a casein coating can be prepared from enzyme converted starch by the addition of ten percent of potassium antimonate. In this development work with a variety of starches, enzyme converted Idaho potato starch yielded the best results. This development, based on the work of Griffin, Truax and Nuttall *(31),* adds to the possibility of opening even the broad field of coated lithographic papers to starch.

In general, starch compares quite well with casein and other protein adhesives commonly encountered in the coating industry, as may be seen from the following tabulation (Table 7).

Starch adhesives

The final field of starch utilization by the paper and paperboard industry is that of water base adhesives for corrugating, laminating, carton manufacture, and sealing operations. Here starch or starch modified dextrins have long played an important role in an industry with specialized adhesive problems.

A discussion of those properties of potato starch which are inherently different from the other starches available in industrial quantities follows.

TABLE 3—Gelatinization temperatures of starches

Work of	Kind of Starch			
	Potato	Wheat	Corn	Rice
Roberts (32)				
deg. F.	144	146	156	165
deg. C.	62.0	63.5	69.0	74.0
Wrede (33)				
deg. F.	145	153	145	142
deg. C.	62.5	67.5	62.5	61.2
Mullen and Pascu (34)				
deg. F.	143	149	155	167
deg. C.	61.5	65.0	68.5	75.0

TABLE 5—Average molecular weights (37)

Subfraction	Corn	Potato
Amylose A_1	13,000 24,000 33,000	11,500
Amylose A_2	340,000	110,000
Amylopectin	45,000	180,000

TABLE 4—Physical properties of starch films—Furry (36)

Starch	Breaking Strength (relative units)	Mean Elongation (relative units)	Double folds
Potato	610.5	1.26	300.4
Corn	607.8	1.03	316.5
Sweet Potato	595.0	0.94	253.8
Wheat	576.5	1.22	276.9
Rice	557.1	1.05	275.4

TABLE 6—Composition of starches Expressed as per cent Amylose by weight Kerr (6, p. 191)

Starch	Butanol (Schoch)	1-Nitro Propane (Whistler & Hilbert)	Pentasol (Schoch)	Hot Water-Butanol (Kerr)
Potato	22	26-27	20-21	25.5
Tapioca	21	20-21	17	20
Corn	22	26-28	28	29
Waxy Maize	0			0

Table 7—Comparison of properties of starch and casein

Characteristic	Starch	Casein
Odor	None	"Ripe"
Specific Gravity	1.62-1.65	1.26
Decay, wet	Ferments, but not as readily as protein	Susceptible to attack by air-borne bacteria
Decay, dry	None	Susceptible to decay
Foam	Slight	A considerable problem
Protective Colloid Effect	Excellent	Excellent
Adhesive Strength	Good	Excellent
Price	Low cost adhesive	Higher and subject to extreme fluctuation
Versatility	Virtually unlimited; adjustment by hydrolysis is possible	Limited
*p*H at use	May be varied widely	Limited to the alkaline side
Dye and pigment stability	Compatible with nearly all dyes and pigments	Incompatible with alkali sensitive dyes and pigments

Chemical and physical characteristics of starches

All starches are composed of polymerized glucopyranose units, but the size of the starch molecule, expressed as degree of polymerization, depends on the source and the treatment of the starch. The glucopyranose units may be tied together as either an unbranched polymer, or chain, called amylose, or as a branched chain molecule called amylopectin. The ratio of these two fractions as well as the degree of polymerization of the individual fractions determine the characteristics of starch. Furthermore, the shape and size of the granules typical for each type of starch may be indicative of the performance of the starch in papermaking.

Characteristics of potato starch

Potato starch is quite similar to tapioca starch in viscosity measurements. Both tapioca and potato starch produce a higher relative viscosity in aqueous dispersion in proportion to their weight than do the cereal starches. The gelatinization temperature, at which viscosity is at a maximum, is around 144 F. (62.C.) for potato starch, appreciably lower than for other common starches (Table 3).

The lack of complete agreement evident in comparing the work of various investigators has been explained, in part at least, by Meiss and his coworkers *(35)*, who showed that soluble impurities in the process water used in the manufacture of commercial grades of starch account for appreciable variation in viscosities and gelatinization temperatures of starches, even though the cooking is carried out under carefully standardized conditions.

The film formed by potato starch has unusual characteristics of strength, toughness, and flexibility. Seck and Brem *(7)* observed a tensile strength of five kilograms per square millimeter or 70,900 pounds per square inch when testing unsupported starch films. Houtz *(17)* also commented on the high film strength of potato starch, as did Furry *(36)* who found potato starch slightly stronger than several starch varieties tested (Table 4). Since the increase in desirable properties of paper is largely governed by the strength of the film of starch, this characteristic of potato starch is highly important from the user's point of view.

Other properties of potato starch of interest to the paper manufacturer are the facts that potato starch films have unusual clarity and freedom from color. Also, according to Gale *(39)*, less enzyme is required for conversion when potato starch is substituted for corn starch. Gale also states that potato starch yields a more lustrous film and a more transparent sizing solution. Meyer and Rathgeb *(37)*, have done work which shows that potato starch has much less tendency to gel upon standing than corn starch.

Some theoretical explanations

After careful fractionation of different varieties of starches, Meyer and Rathgeb attribute the lower gelling and retrogradation tendencies of potato starch to the lower average molecular weight of the amylose subfractions when compared to corn starch (Table 5). This theory would seem sound in view of the recent work which revises prior estimates of amylose percentages and indicates almost identical amylose-amylopectin weight ratios for potato and cereal starches (Table 6).

The conversely greater average molecular weights in the amylopectin fraction may well have some connection with the higher relative viscosities of potato starch *(38)*.

Conclusion

Potato starch has become an important non-fibrous raw material for the paper industry due to its merits as well as to economic factors. A thorough survey of the literature shows that many of the merits of potato starch are well recognized in the technical material published, and that native potato starch is often superior to other unmodified starches in papermaking uses. The literature fails to show a comparison be-

tween oxidized potato starch and other oxidized starches. In view of the superiority of unmodified potato starch over many other unmodified starches, thorough laboratory and production scale investigations and comparisons of oxidized potato starch with other oxidized starches, as applied in papermaking, should be of value to the paper industry.

Acknowledgment

This survey of current literature was made possible by a grant jointly provided by the *American Key Products Co.*, New York, N. Y., and the *St. Anthony Starch Co.*, St. Anthony, Idaho.

The survey was carried out under the supervision of *Dr. Alfred H. Nadelman*, Head of the Curriculum and Professor of Pulp and Paper Technology at Western Michigan College, Kalamazoo, Mich. The author wishes to express his appreciation for the financial support supplied by the two above mentioned companies and the guidance of Dr. Nadelman.

Figure 12 was selected from the work of Sawyer, Beals & Neubauer (40) and Figure 13 from "The Manufacture and Dyeing of Paper"(41).

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Paper Mill Power—Part III

Why by-product power is cheap power

DAVID MOFFAT MYERS
Myers & Addington

▶▶▶ IN THE TWO preceding installments, emphasis has been placed upon the gains obtainable by balancing a paper mill power plant so as to secure all or most of the needed electrical energy as a by-product of the process steam.

Before showing the means by which a plant can be thus balanced, it may be appropriate to explain why by-product power is so cheap to generate.

Turbine acts as reducing valve

The turbine receives high-pressure steam at the throttle and exhausts it at a lower pressure, and in that function acts as a reducing valve between the boilers and the process mains.

But whereas the reducing valve generates no power, the turbine reduces the steam pressure while at the same time it produces electrical energy, removing in this process only a small fraction of the heat of the initial steam, the balance being discharged to process.

The percentage of the heat thus discharged depends upon the steam conditions at throttle and exhaust and the efficiency of the turbine-generator.

For example, take the case of a good 5000 kw turbine unit supplied with steam at 600 lb. gauge with total temperature of 710 deg., exhausting at a back pressure of 40 lb. and operating at full load. It will pass about 22.3 lb. of steam per kw-hr.

The throttle pressure and temperature have been selected to give a small degree of superheat in the exhaust.

The heat in a pound of the throttle steam is 1,356 btu and in the exhaust it will be about 1,195 btu, or 88.1 per cent of the heat in the throttle steam, all of which is available for process.

Now if the process steam were supplied directly from boilers with no by-product power generation, it would still be necessary to generate 88.1 per cent of the heat required for the combination of process and power. Therefore, the power has cost only 11.9 per cent of the total steam produced. Hence, the name of by-product power.

This percentage will vary with efficiency and pressure levels, but the example quoted gives a very fair representation of the effect of this practice in general.

In the above example, only 11.9 per cent of the fuel burned in the boilers is chargeable to power generation. This illustrates why by-product power is cheap power.

In a central steam station of the public utility, all of the fuel is chargeable to power, its single product, and an average of about 1.2 lb. of coal, or 15,600 btu of fuel, are used to generate a kw-hr., the major portion of the heat being lost to the condenser.

In the above example, our paper mill has used 3600 btu of steam per kw-hr., allowing for electrical and mechanical losses, or only 23 per cent of the central station consumption, to which latter must be added transmission and distribution losses of 10 to 20 per cent. The customer must also pay additional increases to cover profit and taxes.

Cost of by-product power

In large paper mills by-product power is generated, all charges included, at between two and three mills per kw-hr.

Such unit cost will vary with the capacity and load factor of a given paper mill power plant, the cost of fuel and labor, the ratio of steam to power demand, and the excellence of design and operation.

A fair target for a paper mill to aim at would be as follows: for a plant of 30,000 kw., 2.3 mills; 15,000 kw., 2.7 mills; 10,000 kw., 2.9 mills; 5,000 kw., 3.7 mills, and 3000 kw., 4.5 mills.

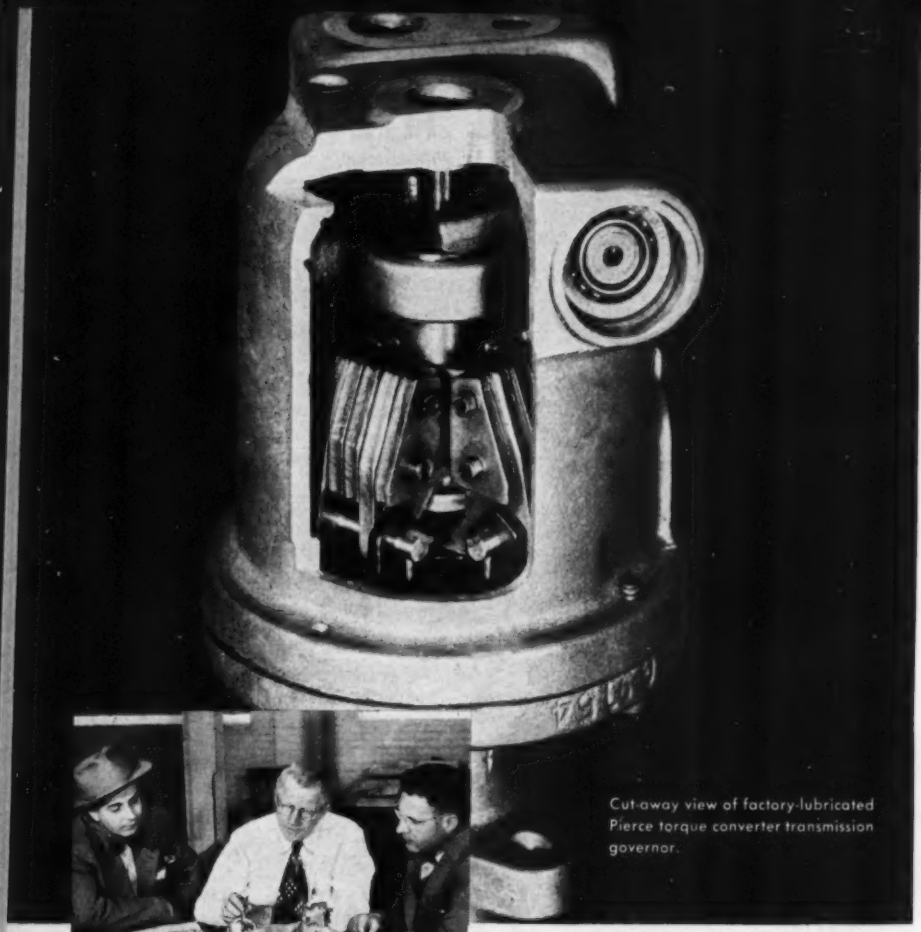
PAPER SKETCHES

Pioneer printing craftsmen of the 15th century learned how to save approximately five per cent on the paper used in the bibles they printed by making each page hold 42 lines of printing instead of the 40 lines they originally used.

A PAPER MILL said to have been built in the 13th century, is still producing paper by old-fashioned methods at Val de Lagat, France.

PAPER represented about half the cost of producing a printed book in the very early days.

A HAND-MADE paper outfit, run by a vatman, coucher and a layer, is being operated as an exhibit at the Festival of Britain. This outfit was carefully designed to fit into limited space and the machines are driven at correct speed by a series of gear units.



Cut-away view of factory-lubricated Pierce torque converter transmission governor.

Left to right: F. C. Hess, Standard Oil lubrication specialist, W. E. Benjamin, Pierce Governor Company engineer, and A. C. Cartley, Standard Oil Lubrication Engineer, discuss vital part played by STANOLITH Grease in pre-lubrication of Pierce governors.

Elected for governor job . . .

TO INSURE trouble-free lubrication of their product in the field, officials of Pierce Governor Company, Inc., Anderson, Indiana, initiated the production of a factory-lubricated sealed unit type governor.

A special grease was found that did the job, but as production of the sealed units mounted, this grease became a costly production item. That's when STANOLITH Grease, recommended by a Standard Oil Lubrication Specialist, was tried. In test block runs simulating 10,000 hours of actual operation, at speeds ranging up to 4,000 RPM and temperatures from 150°F. to 200°F., STANOLITH did an even better job than the original lubricant.

STANOLITH factory-lubricated governors now have been in service for over eight months with no troubles resulting from bearing failures, overheating, or leakage of the lubricant. STANOLITH's lower cost has been an added advantage.

STANOLITH
TRADE MARK
Greases

This is one of many success stories reported by users of STANOLITH. For the beginning of your own lubrication success story, call your local Standard Oil (Indiana) office for the services of a lubrication specialist.

Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.

What's YOUR problem?

F. C. Hess, of Standard Oil's Indianapolis, Indiana, office, is the Standard Oil lubrication specialist who recommended STANOLITH to operators of the Pierce Governor Company, Inc., enabling them to make an appreciable cut in production costs.

Throughout the Midwest there is a corps of specially trained, experienced lubrication specialists ready to give you prompt, on-the-spot help with any lubrication problem. Each of these men has been carefully trained in a Standard Oil Lubrication Engineering School. It's easy to get the services of a lubrication specialist — just phone or write to your local Standard Oil Company (Indiana) office. When he stops by to see you, ask him about the following fine Standard products:

STANOIL Industrial Oils—This general-purpose line of oils provides cleaner operation of hydraulic units and supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears, better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUSTs form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically developed for its intended use. The grades range from a fingerprint remover to a heavy petrolatum that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY (INDIANA)

STANDARD

The Paper Industry Association News

R. G. MACDONALD (right) presents charter and gavel to Lew Burnett as new division chairman William Hasselo looks on

Wm. Schoenberg (right) receives testimonial plaque from C. P. Spring for his work in helping start the section

Lake Erie Section Receives National TAPPI Charter

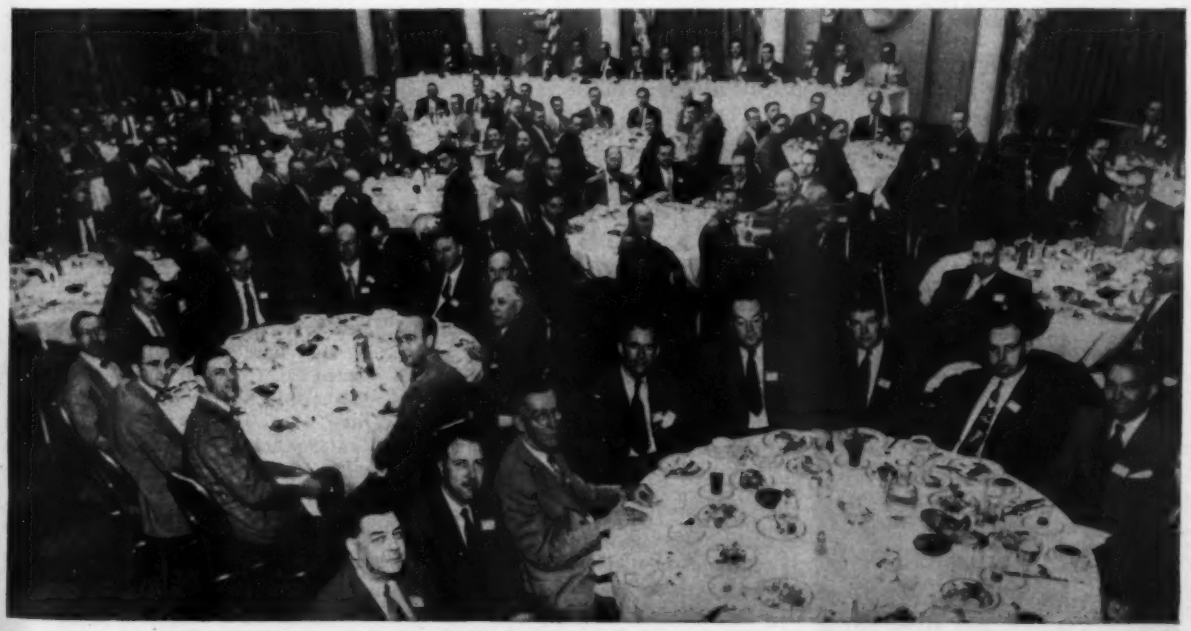
▶▶▶ The First Corrugated Combining Conference was held in Cleveland, May 17-18, with the Lake Erie Section of TAPPI as host. About 150 delegates from 18 different states attended this meeting.

Chairman Lew Burnett (Ohio Boxboard Co.) welcomed the delegates. At the opening of the business sessions, he introduced Moderator Des Long, technical director of Container Corporation of America and chairman of TAPPI's Corrugated Containers Committee. Mr. Long discussed the work of the Committee on the many problems of the corrugated industry. A questionnaire already has been circulated on adhesives and another will be circulated about June 1, covering the activities of the High-Low Corrugations, Fingerline, Corrugator Roll Wear and Heat-Moisture Control sub-committees.

Discussions of pertinent subjects were conducted during the business sessions of the two-day meeting by the following men:

Carelton Root, of Container Section, Institute of Paper Chemistry. Subject—Theoretical and actual qualities of corrugated board.

Discussion centered about a new approach to the prediction of strength characteristics of corrugated board using basic techniques presently used in the design and engineering of structures such as bridges and airplanes. Mr. Root stated that it had been found possible to obtain modulus of elasticity data on component materials and together with other constants, use this information in the



LUNCHEON at the Statler Hotel in Cleveland helped the first Corrugating Conference sponsored by the Lake Erie TAPPI Division get off to a good start

computation of maximum load of tubes. This work is currently being extended to boxes. Other considerations of basic value being investigated include flat crush, fatigue, and bursting strength and their effect on the box strength. It was stated that the method currently being investigated should prove a valuable new tool which will place more emphasis on quality through furnishing basic information on raw materials and ultimate performance of corrugated containers.

R. T. Cassidy, vice president of the Jackson Box Co. Subject—Present operating problems and future hopes of a corrugated superintendent.

The speaker drew from his 12 years of experience in the production of corrugated containers during which time he served as superintendent and production manager. Problems of adhesion, roll wear, fingerlines, and high-low corrugations were brought out. The importance of good housekeeping and preventive maintenance was stressed. Future hopes outlined were speeds of 1000 fpm with automatic splicing equipment and side guides.

Walter Goettsch, vice president of Samuel Langston Co. Subject—Past, present and future design of corrugated combiners. Mr. Goettsch traced the beginning of the corrugator back in 1870 with development in 1880 of single-face, and in 1895 double-face, regular slotted containers.

A. E. Montgomery, vice president of the J. O. Ross Engineering Corp. Subject—Theoretical problems of heating and drying.

The speaker treated the corrugator operation as a heat transfer problem. The basic formula states that the quantity of heat needed in Btu's is dependent on the coefficient of heat transfer of the material, the area of heating surface, and the temperature difference between the material being heated and the temperature of the heating medium.

George E. Fields, technical service manager of the Plastics Division of the B. F. Goodrich Chemical Co.

Using his experiences in the development of synthetic rubber, the speaker outlined the need for more co-operation between *technical* and *operating* personnel in industry today.

Charter and gavel are presented by Macdonald

The dinner meeting on the evening of the second day was a rather special occasion. Special speaker was R. G. Macdonald, secretary-treasurer of National TAPPI, who discussed the historical background leading to the formation and development of National TAPPI and its sectional groups. At the close of his talk, Mr. Macdonald presented Chairman Burnett with a charter and gavel, symbolizing the official inception of the Lake Erie Group as a local section of TAPPI.

Also present at the dinner was Richard P. Price, TAPPI Executive Committee Member, and vice president of Hammermill Paper Co.

A short business meeting was held at which time the new constitution was put to a member vote. Also voted on was the new slate of officers for the coming year. Those elected to serve are:

Chairman—William Hasselo, Container Corp. of America
1st Vice Chairman—Joe Thompson, Minerva Wax Paper Co.
2nd Vice Chairman—R. L. Lewis, Ohio Boxboard Co.
Secretary—L. E. Rolig, Ohio Boxboard
Treasurer—Wm. Schoenberg, Lord and Schoenberg

During their attendance at the meeting, the visitors visited plants of the Hankins Container Co. and the Robert Gair Co., Cleveland.

Canadian Technical Section holds 37th summer meeting

▶▶▶ THE THREE-DAY Summer Meeting of the Technical Section of the Canadian Pulp and Paper Association was held June 7-9 at Bigwin Inn, Lake of Bays, Ontario. More than 500 engineers, scientists, chemists, executives, and officials associated with the Pulp and paper industries of Canada and the United States attended. It was the Section's 37th summer meeting.

W. W. Holland, chairman of the Section's executive Council and now superintendent of the Quebec North Shore Paper Co., Baie Comeau, Que., acted as general chairman of the meeting and presided at the dinner meeting.

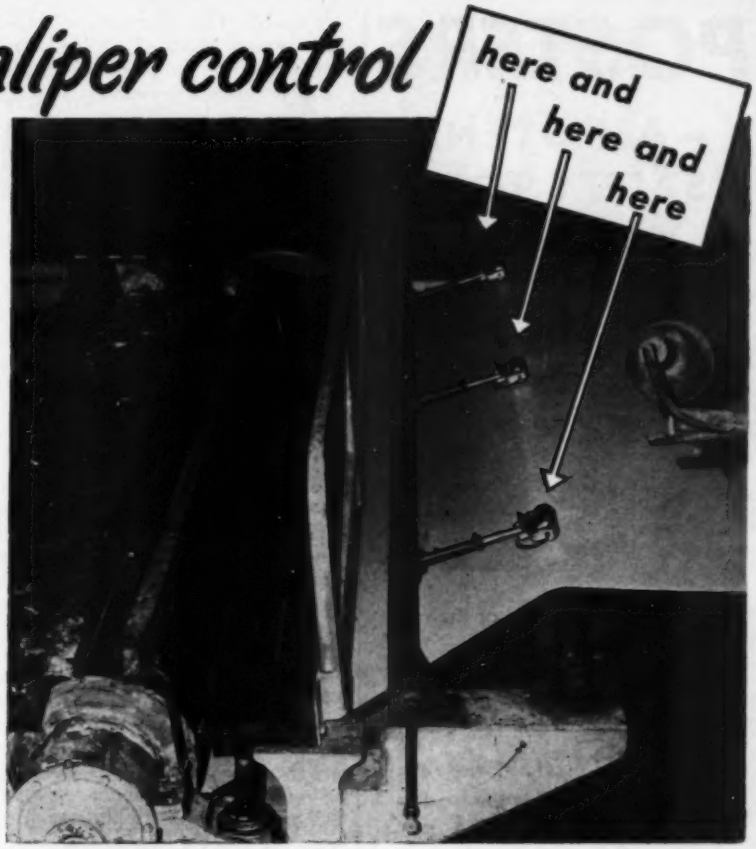
Dr. W. Boyd Campbell, director of technical research, Pulp and Paper Research Institute of Canada, was guest speaker at the Section's dinner meeting. At that time, Chairman Holland presented Dr. Campbell with an honorary life membership in the Technical Section.

Men who presented papers, or otherwise took part in the sessions included:

Dr. G. H. Tomlinson II, director of research, Howard Smith Paper Mills Ltd., Cornwall, Ontario, reported on his research work over the past four years on the analysis of black liquor used in the cooking of wood chips for kraft pulp making.

L. S. Campbell, chief chemist, Gair Co.

Automatic caliper control



. . . gives you uniform caliper and weight at the dry end

HURLETRON
Automatic
CALIPER and WEIGHT
CONTROL

And here's the equipment that does it. Yes . . . the Hurletron Automatic Caliper and Weight Control

. . . holds wet end caliper fluctuations to plus or minus one point.

. . . automatically measures thickness at 40" *intervals clear across the sheet.*

. . . automatically makes corrections when required by decreasing or increasing stock flow *but only after a trend has been established.*

. . . automatically provides a continuous, permanent record of wet end caliper.

. . . automatically signals operator when a drift across the sheet is indicated.

. . . automatically provides a continuous reading and record at the dry end . . . a complete history of every foot in the roll.

RESULT

. . . consistent uniformity in dry end caliper and weight.

. . . a definite saving in tonnage through better control of wet-end fluctuations.

. . . increased hourly production.

. . . improved product quality.

. . . reduced operating costs.

. . . important savings in man and machine hours.

The Hurletron Control is precision-engineered . . . precision-built and ruggedly constructed to stand up under the most rigorous service. Its unusual advantages have been fully demonstrated and proved by long and continuous service in many of the country's leading mills. These advantages are available to you now. Why not talk it over with one of our engineers? Write, wire or phone . . . there's no obligation.

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Complete details about the Hurletron Automatic Caliper and Weight Control are contained in our bulletin No. 211. Write for your copy today.

ELECTRIC EYE EQUIPMENT COMPANY
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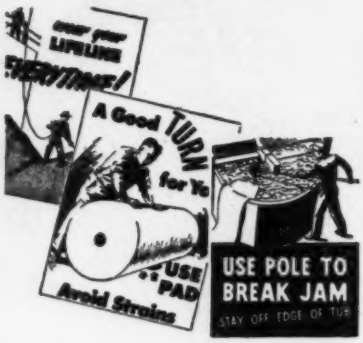
POSTERS
—A POTENT SAFETY TOOL



Posters should be one of the top aids in your safety program. No other safety medium can reach your entire audience—not once, but many times each day—with such low-cost safety messages. They are directed at the worker acts and worker attitudes that lead to accidents. Posters lend *timeliness, repetition* and *continuity* to your safety program . . . the three fundamental principles of direct selling.

The National Safety Council maintains a stock of posters that covers all industries, operations and phases of safety and health. These posters are produced in three sizes: "A" size, 8½" x 11½"; "B" size, 17x23"; and "C" size, 25x38". Their colorful illustrations and eye-catching captions make them ideal for the mass selling of safety.

Write for a free copy of the 1951 Directory of Occupational Safety Posters. This 72 page catalog illustrates 744 posters, indexed and classified for specific operations.

NATIONAL SAFETY COUNCIL

425 N. Michigan Ave.

Chicago 11, Illinois

(Canada) Ltd., Toronto, discussed the various effects of coating of paperboard and its printability which is of importance to clearness of design and printing on containers.

Dr. A. H. Vroom, formerly with the Pulp and Paper Research Institute of Canada, and now with Weyerhaeuser Timber Co., Longview, Wash., outlined a new method of using bark by the industry.

G. Goumenlouk, research engineer, the Powell River Co., Ltd., Powell River, B. C., reported on his studies at Powell River over the past five years. He lead a discussion on the removal of water from the pulp stock as it flows through the machine and the pulp fibers onto the paper.

Drs. J. H. Herbst and *H. B. Marshall*, of the Ontario Research Foundation, Toronto, and *Dr. R. M. Husband*, assistant professor, department of chemical engineering, University of Toronto, present papers fundamental research session on June 7.

Such subjects as pulping processes, fundamental research, engineering developments, and other phases of pulp and paper manufacture were discussed. One of the most important subjects brought into discussion was the reduction of sulphur consumption. The pulp and paper industry is the largest consumer of sulphur in Canada, and in view of cut-backs on deliveries from the United States, this subject was most timely.

The final event of the meeting was the annual golf tournament for the R. A. McInnis trophy. This cup, donated by the late R. A. McInnis, former general manager of Anglo Canadian Pulp and Paper Mills, Ltd., Quebec, P.Q., and chairman of the Technical Section, 1929-1930, may be won only by a member of the Section.

Kalamazoo Section of TAPPI Elects Officers at Annual Fun Day

Annual fun day of the Kalamazoo Valley Section of TAPPI was held June 7 at the Gull Lake Country Club, near Kalamazoo, Mich. About 170 members of the Section attended, accompanied by a number of guests. The program and dinner was sponsored by 105 affiliated industries, with Robert T. Powers, representative of National Aluminate Corp., in charge of arrangements.

John R. Dam, Jr.

At the close of the day's festivities, a business session was held at which time new officers for the coming year were elected. Those elected to serve are: Chairman—John R. Dam, Jr., chemist of Allied Paper Mills, Kalamazoo; vice chairman — A. T. Luey, Sutherland Paper Co., Kalamazoo; secretary—Reginald Hurst, Kalamazoo Vegetable Parchment Co., Parchment; treasurer—James A. Dean, Michigan Paper Co., Plainwell.

New Officers To Serve Lake States TAPPI

At the May 15 meeting of the Lake States Section of TAPPI, the following officers were elected to serve for the coming year:

Chairman—Dr. Alan P. Adrian, Neenah Paper Co., Neenah, Wis.; Vice Chairman—Dr. Herbert Rowe, Nekoosa-Edwards Paper Co., Port Edwards, Wis.; Secretary—Robert Seidl, Forest Products Laboratory, Madison, Wis.; Treasurer—Dr. L. A. Moss, Whiting Plover Paper Co., Stevens Point, Wis.

J. H. Lonergan now Officially Appointed Secretary of NPTA

The official appointment of J. H. Lonergan as executive secretary of the National Paper Trade Association has just been announced. Mr. Lonergan has filled the office temporarily since the resignation of W. G. Leathers in April.

Coming Events

Sept. 10-14—The Sixth National Instrument Conference and Exhibit, sponsored by the Instrument Society of America, will be held at the Sam Houston Coliseum, Houston, Texas.

Sept. 14-15—Fall meeting of the Northwestern Division of the Superintendents Association to be held at the Northern Holiday Resort, Marenisco, Mich.

Sept. 16-19—Regional meeting of the American Institute of Chemical Engineers, to be held at French Lick, Ind.

Sept. 26-28—TAPPI Alkaline Pulping Conference, John Marshall Hotel, Richmond, Va.

Oct. 1-4—Sixth Annual Industrial Packaging and Materials Handling Exposition, sponsored by the Scciety of Industrial Packaging and Materials Handling Engineers, will be held at the Cleveland Public Auditorium, Cleveland, Ohio.

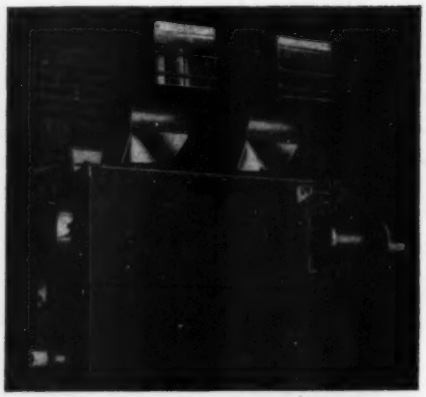
Oct. 8-10—Annual meeting of The American Forestry Association and the Society for the Protection of New Hampshire Forests, to be held at Jefferson, N.H.

Oct. 8-12—39th Annual Congress of the National Safety Council, Chicago, Ill. Headquarters will be in the Stevens Hotel; other schedules and program details to be announced later.

Oct. 10-12—A joint meeting of the Southern and Southeastern Divisions of the Superintendents Association at the George Washington Hotel, Jacksonville, Fla.

Oct. 15-18—Sixth TAPPI Engineering Conference, General Oglethorpe Hotel, Savannah, Ga.

HEAT WHERE IT'S NEEDED!



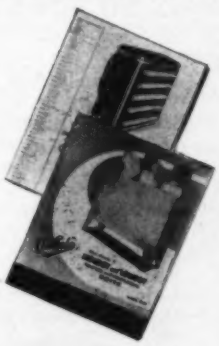
SUSPENDED — OUT OF THE WAY!

"Buffalo" LOWBOY heaters take no floor space. Unit has efficient "Buffalo" fan for positive heat throw, and can be used for straight ventilation in warm weather. LOWBOY heaters are also used to supply makeup air in plants, mills and foundries where exhausters ars used extensively.

PLAN NOW FOR NEXT WINTER

QUALITY-BUILT HEATING, VENTILATING AND FRESH AIR UNITS — A RIGHT MODEL FOR EVERY TYPE OF INSTALLATION

Getting the heat to the worker, or to the working area can sometimes be a problem—but not with the complete range of models in the "Buffalo" Unit Heater line. This line includes everything from the efficient BREEZO-FIN heaters which can throw heat down over a section of benches or machines—to the big HIGHBOY and LOWBOY heating and ventilating units for distributing heat over large areas. LOWBOYS can be mounted on walls or ceilings, without using up productive or storage space. The narrow HIGHBOYS are economically installed on floors next to walls, where they require little space. *For complete information, write for free Bulletins 3137-D and 3704-A.*



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The Paper Industry Safety News

Fourth Month of Contest Shows 100 Perfect Scores

▶▶▶ AT THE END OF the fourth month of THE PAPER INDUSTRY Safety Contest for 1951, the rate is 3 per cent lower than the corresponding rate of the 1950 Contest. Cumulative scores for this period show an even 100 entrants with perfect scores.

The list of perfect score participants is given here according to the reclassification of mills in the present contest. Contest rules provide that a contestant's size group shall be determined on the basis of his average monthly exposure to the end of April. This will explain why some contestants have been shifted to a different group of the same division. Contestants are now classified into the groups in which they will compete for the remainder of the contest.

Division I—Pulp and Paper Mills

Group A

1—Ecusta Paper Corp., Pisgah Forest, N. C.

Group B

1—Consolidated Paper Corp. (Laurentide Div.), Grand Mere, P. Q., Can.
1—Kimberly-Clark Corp., Niagara, Wis.
1—Flintkote Co., New Orleans, La.
1—West Virginia Pulp and Paper Co., Tyrone, Pa.
1—Bemis Bro. Bag Co., Peoria, Ill.
1—Marinette Paper Co., Marinette, Wis.
1—National Container Corp. (Kraft Pulp Div.), Jacksonville, Fla.
1—Combined Locks Paper Co., Combined Locks, Wis.
1—Rayonier, Inc., Shelton, Wash.
1—Container Corporation of America (Lake Shore Plant), Chicago, Ill.
1—Thilmany Pulp and Paper Co. (Lower Mill), Kaukauna, Wis.
1—Johns-Manville, Manville, N. J.

Group C

1—West Virginia Pulp and Paper Co., Williamsburg, Pa.
1—Ste. Anne Paper Co., Ltd., Beaupre, P. Q., Can.
1—Brunswick Pulp and Paper Co., Brunswick, Ga.
1—Building Products Ltd., Montreal, P. Q., Can.
1—International Paper Co. (Southern Kraft Div.), Mobile, Ala.
1—Lawrence Paper Co., Lawrence, Kans.
1—Congoleum-Nairn, Inc., Cedarhurst, Md.
1—Fraser Cos., Ltd., Newcastle, N. B., Can.
1—Bird and Son, Inc. (Shreveport Felt Mill), Shreveport, La.
1—Certain-teed Products Corp., Savannah, Ga.
1—Riverside Paper Co., Appleton, Wis.
1—Riegel Paper Corp. (Warren Plant), Warren Glen, N. J.

Group D

1—Philip Carey Co., Lennoxville, P. Q., Can.
1—Certain-teed Products Corp., Marseilles, Ill.
1—Lloyd A. Fry Roofing Co., Summit, Ill.
1—Mead Corp. (Wheelwright Div.), No. Leominster, Mass.
1—Mead Corp., Harriman, Tenn.
1—Container Corp. of America, Carthage, Ind.
1—Mead Corp., Manistique, Mich.
1—U. S. Gypsum Co., Oakmont, Pa.
1—Crown Zellerbach Corp., Lebanon, Ore.
1—Container Corp. of America (Ogden Div.), Chicago, Ill.
1—Marathon Corp., Ashland, Wis.
1—Container Corp. of America, Los Angeles, Calif.
1—Flintkote Co., Little Ferry, N. J.
1—Strathmore Paper Co. (No. 1 Mill), Woronoco, Mass.
1—Lloyd A. Fry Roofing Co., Compton, Calif.
1—American Writing Paper Corp. (Albion Div.), Holyoke, Mass.
1—Columbia Box Board Mills, Inc., Chatham, N. Y.
1—Mead Corp., Nashville, Tenn.
1—American Writing Paper Corp. (Nonotuck Div.), Holyoke, Mass.
1—Riegel Paper Corp. (Hughesville Mill), Riegelsville, N. J.
1—Central Fibre Products Co., Denver, Colo.
1—Kimberly-Clark Corp. of Canada, Kapuskasing, Can.
1—Container Corp. of America, Wilmington, Del.
1—National Gypsum Co., Newburgh, N. Y.
1—Johns-Manville, Tileton, N. H.
1—Volney Felt Mills, Inc., Mishawaka, Ind.
1—Amalgamated Roofing Mills, Chicago, Ill.
1—Riegel Paper Corp. (Riegelsville Plant), Riegelsville, N. J.
1—International Paper Co., Livermo Falls, Maine
1—Spaulding Fibre Co. (Hayes Plant), Rochester, N. H.

Division II—Paper Converting

(1) Paper Bags

1—St. Regis Paper Co. (Bag Plant), Seattle, Wash.
1—St. Regis Paper Co. (Bag Plant), Nazareth, Pa.
1—St. Regis Paper Co. (Bag Plant), San Leandro, Calif.
1—St. Regis Paper Co., Ltd., Dryden, Ont., Can.
1—Thilmany Pulp and Paper Co., Kaukauna, Wis.
1—Hammond Bag and Paper Co., Pine Bluff, Ark.
1—St. Regis Paper Co. (Bag Plant), Watertown, N. Y.

(2) Boxes and Cartons

Group A

1—Stone Container Corp., Chicago, Ill.
1—Fibreboard Products, Inc., South Gate, Calif.

Group B

1—Hankins Container Co., Union, N. J.
1—Container Corp. of America, Greensboro, N. C.
1—Container Corp. of America, Baltimore, Md.
1—Gaylord Container Corp., Dallas, Texas
1—Gaylord Container Corp., Greeneville, Tenn.
1—Gaylord Container Corp., Milwaukee, Wis.
1—Gaylord Container Corp., Tampa, Fla.
1—Hankins Container Co., Chicago, Ill.
1—Green Bay Box Co. (Corrugated Div.), Green Bay, Wis.
1—Container Corp. of America, Portland, Ore.
1—Container Corp. of America (Lake Shore Plant), Chicago, Ill.
1—Container Corp. of America, Philadelphia, Pa.
1—South West Box Co., Sand Springs, Okla.
1—South West Corrugated Box Co., Fort Worth, Texas
1—Container Corp. of America, New Orleans, La.
1—Hankins Container Co., Miamisburg, Ohio
1—Bay West Paper Co., Green Bay, Wis.
1—Container Corp. of America, Muskogee, Okla.
1—Hankins Container Co., Elmira, N. Y.

(3) Roofing Paper

1—Flintkote Co., Chicago Heights, Ill.
1—Ruberoid Co., Gloucester, N. J.
1—Bird and Son, Inc., Chicago, Ill.
1—Johns-Manville, Marrero, La.
1—Certain-teed Products Corp., Dallas, Texas
1—Lloyd A. Fry Roofing Co., Stroud, Okla.
1—Certain-teed Products Corp., Buffalo, N. Y.
1—Lloyd A. Fry Roofing Co., San Leandro, Calif.
1—Johns-Manville, Los Angeles, Calif.

(4) Insulation and Building Board

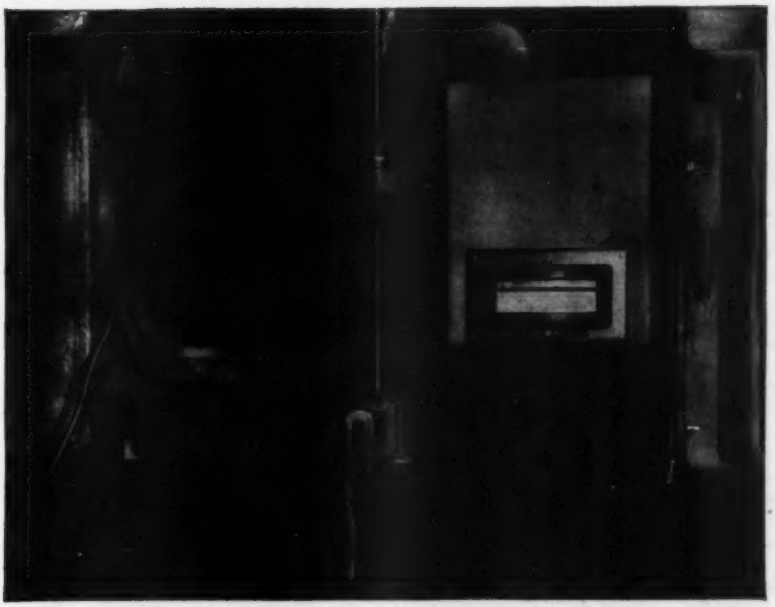
1—Celotex Corp., Metuchen, N. J.

(5) Specialities

1—Lily-Tulip Cup Corp., Augusta, Ga.
1—Canadian Cellucotton Products Co., Ltd., Niagara Falls, Can.
1—Old Colony Envelope Co., Westfield, Mass.
1—Kimberly-Clark Corp., Appleton, Wis.
1—Research Products Corp., Madison, Wis.
1—Scott Paper Co. (Cut-Rite Div.), Sandusky, Ohio
1—Lily-Tulip Cup Corp., French Lick, Ind.

Division III—Pulpwood Logging

(No entrants)



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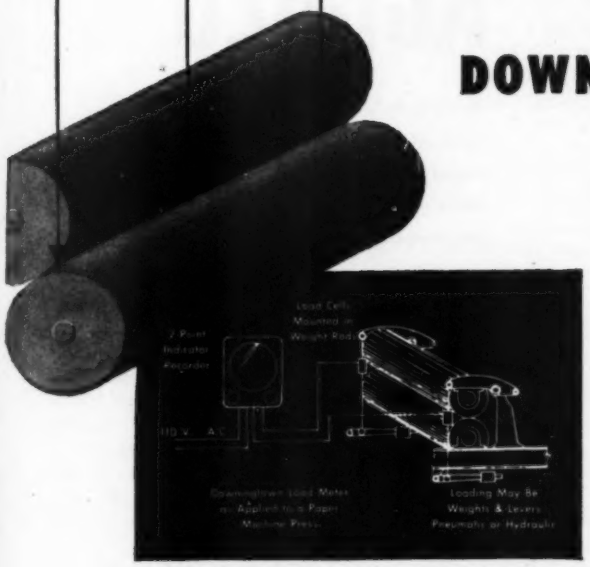
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Loading May Be Weights & Levers Pneumatic or Hydraulic

This drawing shows points which might cause inaccurate load readings are by-passed by the Downingtown control system.

Most ordinary gauges used to measure the load on a sheet at various pressure points, fail to deliver an accurate measurement because the readings are influenced by . . .

pin friction
knife edge friction
eccentric and misaligned rolls
piston packing and gland friction
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The Downingtown Load Meter exactly measures the load at each end of the rolls, *directly*. Thus, accurate loading across the entire roll is assured with proper crowning, and pressure is controlled as required by the sheet made.

The Downingtown Load Meter has no moving parts to wear, does not change calibration with use nor normal temperature variations. It is simple, inexpensive and easy to install.

Write for complete information about the Downingtown Load Meter developed expressly for the paper and board making industry.

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DOWNINGTOWN LOAD METER

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paper or paperboard **PROBLEMS?**

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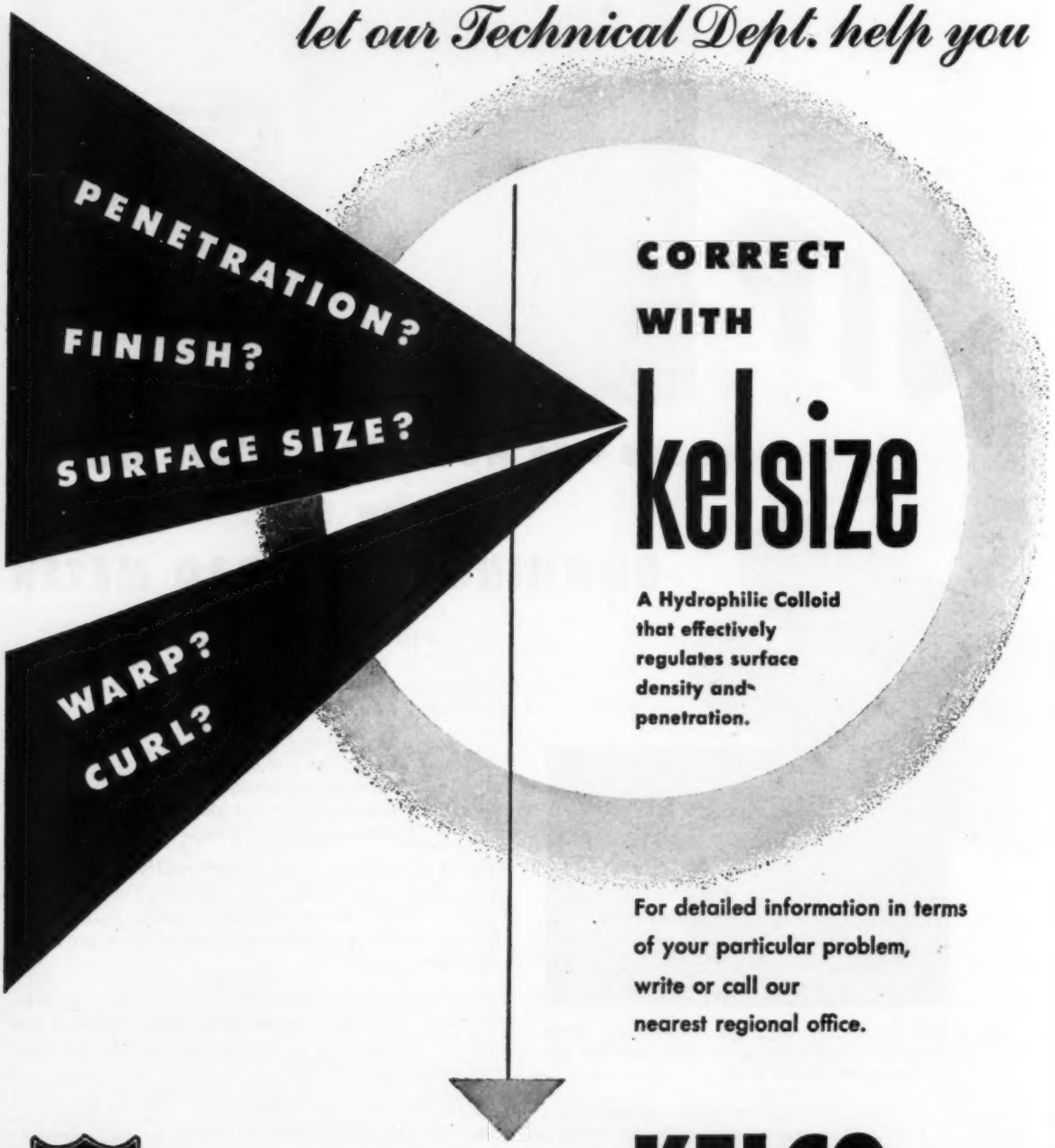

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The Paper Industry Names in the News

KVP Announces Several Exec. and Supervisory Personnel Changes

Following a meeting of the Board of Kalamazoo Vegetable Parchment Co., Parchment, Mich., late in May, President Alfred Southon announced a number of executive and supervisory personnel changes. The appointment of E. Norval Hunter, who was made a vice president in charge of all KVP Canadian operations, was announced in this section last month. Other changes passed at the KVP board meeting are:

Thomas W. Peck, secretary of the company since August 1925, retired on July 1. Company records revealed that Mr. Peck had missed only three board meetings during his term of office.

John C. Wood, formerly vice president in charge of manufacturing at Parchment, has been placed in charge of manufacturing operations of all plants in the United States. These include: Devon, Pa.; Sturgis, Mich., and Houston, Texas.

Frank D. Libby, who has been in charge of papermaking operations at the Parchment plant, has been appointed corporate pulp and paper consultant and will act as consultant on Canadian as well as United States operations.

William Hess has been appointed chief accounuting officer, and *Stewart Geelhoed* has been named accounting supervisor of the Parchment plant. *Robert A. Miller* has been placed in charge of cost control, industrial engineering, and cost estimating as plant controller.

Robert D. Caine has been appointed manufacturing manager with his duties including supervision of the purchasing department, headed by *Frank Wotalewisz,* the traffic and shipping departments, headed by *Melvin Lievense,* and the engineering and maintenance departments, headed by *Fred Ter Burgh.* Mr. Caine will be assisted in the production operations by *Marshall Rutz,* who has been named manufacturing superintendent. He will have supervision over the four production divisions at Parchment—papermaking, parchment, wax, and printing.

William F. Hathaway has been made general superintendent of papermaking, and *Alvin Hamilton* is now superintendent of the vegetable parchment division. *Clifford Skinner* heads the wax division and *Dellmore Moffett* is in charge of the printing division.

Geo. Pringle Will Direct General Engineering Dept. of Mead Corp.

The appointment of George H. Pringle as chief engineer has been announced by The Mead Corp., Chillicothe, Ohio. He will direct the general engineering department of the company and will be located in Chillicothe.

J. B. Gough, formerly chief engineer, will continue as consulting engineer in an advisory capacity to Mr. Pringle and the management.

Mr. Pringle has been assistant chief engineer of Mead since April, 1947. He is national vice president of the Technical Association of the Pulp and Paper Industry.

E. J. Gayner III now Brunswick President— Van de Carr Resigns

Due to the press of other duties including the presidency of The Mead Corp. and directorship of Scott Paper Co., C. R. Van de Carr, Jr., has resigned the office of president of Brunswick Pulp and Paper Co., Brunswick, Ga. He will continue to serve as a director.

Elected to succeed Mr. Van de Carr, is Edward J. Gayner III, formerly a vice president of the Brunswick company. H. E. Whitaker has been elected a vice president of Brunswick.

George Raymond, Jr. Becomes Exec. V. P. of Lyon-Raymond Corp.

Recent appointments by Lyon-Raymond Corp., Greene, N.Y., include: George G. Raymond, Jr., as executive vice president and general sales manager; Christian D. Gibson, former senior designer and chief engineer is elevated to office of vice president in charge of engineering; Wm. H. Lamb is advanced from assistant treasurer to treasurer; and Carl F. Kellogg has become advertising manager.

George G. Raymond, Sr., is president of the firm.

New Mando Officers

Election of new officers of the Minnesota and Ontario Paper Co. was released June 26 by Company President J. B. Faegre following a meeting of the board of directors.

Ralph D. Main and Robert Faegre have been made vice presidents. Mr. Main has been secretary of the company for the past two years. From 1941 to 1949 he was secretary-treasurer; he joined Mando in 1921. Robert Faegre has been with the Company since 1938. He has served in important positions with Insulite and during World War II, he served in various paper procurement positions with the Government. He has been paper sales manager since 1949.

Hadlai A. Hull, secretary of Mando since 1949, has been made secretary-treasurer.

KVP changes (L to R) Peck, Wood, and Libby

MANDO officers (L to R) Main, Faegre, and Hull

Norman R. Amberg

H. W. Wesenberg

Y&T Appointments

New assistant works manager at the Philadelphia Division Yale & Towne Manufacturing Co. is Norman R. Amberg, who has been chief tool engineer in the Electromotive Division of General Motors Corp. Previously he was with International Harvester Co. and Harnischfeger Corp.

Concurrently, Harvey W. Wesenberg, formerly with the Hudson Motor Car Co., has been appointed supervisor of materials handling of the Y&T plant. He is a member of the American Materials Handling Society.

David Hall Made Pres. of Diamond Mfg. Co.

Formerly vice president and purchasing agent of the Diamond Manufacturing Co., Wyoming, Pa., David C. Hall has been appointed president and general manager of the company to succeed his father-in-law, the late William M. Powell (See Necrology).

Other personnel of the company remains unchanged and the general policy will continue as in the past.

Valley Iron Wks. Holds Election of Officers

Officers elected at the annual stockholders and directors meeting of Valley Iron Works Co., Appleton, Wis., are as follows:

R. A. Peterson, president; Ernst Mahler, vice president; W. K. Kolb, exec. vice president; D. B. DeNoyer, vice pres. in charge of engineering; Paul Boronow, vice pres. in charge of sales; W. A. Homes, secretary-treasurer; and Talbot Peterson, asst. secretary.

Alex Currie has been appointed sales manager of the merchandising division of Appleford Paper Products Ltd., Hamilton, Ont., Canada.

Harry E. Lewis has been named to the newly created position of general sales manager of the Industrial Sales department of the Perlite Division of Great Lakes Carbon Corp., New York. Now responsible for planning and directing all industrial Perlite sales operations throughout the United States, Mr. Lewis was formerly manager of the product development department of the Building Products Division of Great Lakes Carbon.

David H. Ross, president of Gair Co. Canada, Ltd., Toronto, was elected a director of Robert Gair Co., Inc., New York, at a board meeting held may 28. Mr. Ross fills the board vacancy left with the recent resignation of *George M. Willoughby.*

Henry C. Speel has been appointed director of the development department of Wyandotte Chemicals Corp., Wyandotte, Mich. Formerly with General Dyestuffs Corp., Mr. Speel has had extensive experience in market research and market development work over the last 20 years with several large corporations.

Gormley Is Consultant for Black-Clawson & Shartle

The Black-Clawson Co. has announced the appointment of Michael B. Gormley as consultant to the engineering departments of Black-Clawson and Shartle Brothers Machine Co.

Mr. Gormley has been associated with papermaking for more than 30 years. He served as superintendent of several large mills in the United States and at one time he supervised the erection and operation of the widest and fastest tissue machine in South America.

In his new position, Mr. Gormley also will work with the Black-Clawson and Shartle engineers as an operating specialist to assist mill operators in starting up new equipment, including B-C paper machines and Shartle stock preparatory equipment.

Michael B. Gormley

Howard Berry

Howard Berry, formerly vice president, treasurer, and director of Mathieson Chemical Corp., has joined R. S. Aries & Associates, New York consulting engineers and economists, as senior associate.

J. G. Chalmers and *G. T. Cockerill* have been appointed administrative vice presidents of Bathurst Power & Paper Co., Ltd., Bathurst, N. B.

Raymond Hovel Appointed Works Manager of Dilts

As newly-appointed works manager of the Dilts Machine Works Division of the Black-Clawson Co., Fulton, N.Y., Raymond K. Hovel succeeds D. J. Kesterke, who resigned to devote full time to other business interests. Mr. Kesterke had been with Dilts 14 years, having served as works manager for the past ten.

Raymond K. Hovel

Mr. Hovel became associated with Black-Clawson at its Shartle Bros. Machine Co. Division in 1937. During the 12 years at Shartle, he served as industrial engineer in charge of incentives and later as production manager. He has been with Dilts as chief industrial engineer since 1949. In taking on his new assignment, Mr. Hovel has appointed T. C. Dann, member of the incentive department, to direct the incentive program as time study supervisor.

D. D. Rhebeck, who has been in charge of Timber Division accounting for Rayonier Incorporated, Hoquiam, Wash., has been appointed comptroller of the company. He will transfer to the executive offices in New York this month. Mr. Rhebeck has been connected with Rayonier at Port Angeles (Wash.) and Fernandina (Florida).

William J. Tilden, vice president of The Mead Sales Co., will become manager of the company's Chicago office on August 1. He succeeds *George H. Fay,* company first vice president, who is retiring. Mr. Tilden is well known in paper circles; he is Western Vice President of the Salesmen's Association of the Paper Industry.

Officers Announced for Sveen-Pedersen Sales Corp.

Announcement is made of election of the following officers, at a meeting of the board of directors of Sveen-Pedersen Sales Corp., Long Island City, N. Y.

President, Odd Wennberg; vice pres. and sales mgr., Paul Easton; treasurer, Wm. G. Weygand; and secretary, Newman Lawlor.

The Sveen-Pedersen Sales Corp., has been appointed exclusive agent in the United States for sales, engineering, and servicing of the Sveen-Pedersen Flotation Separator. (Cf. P.I. June, 1951).

Mr. Easton is well known in the industry. He has been sales and service engineer for Hercules Powder Co.,

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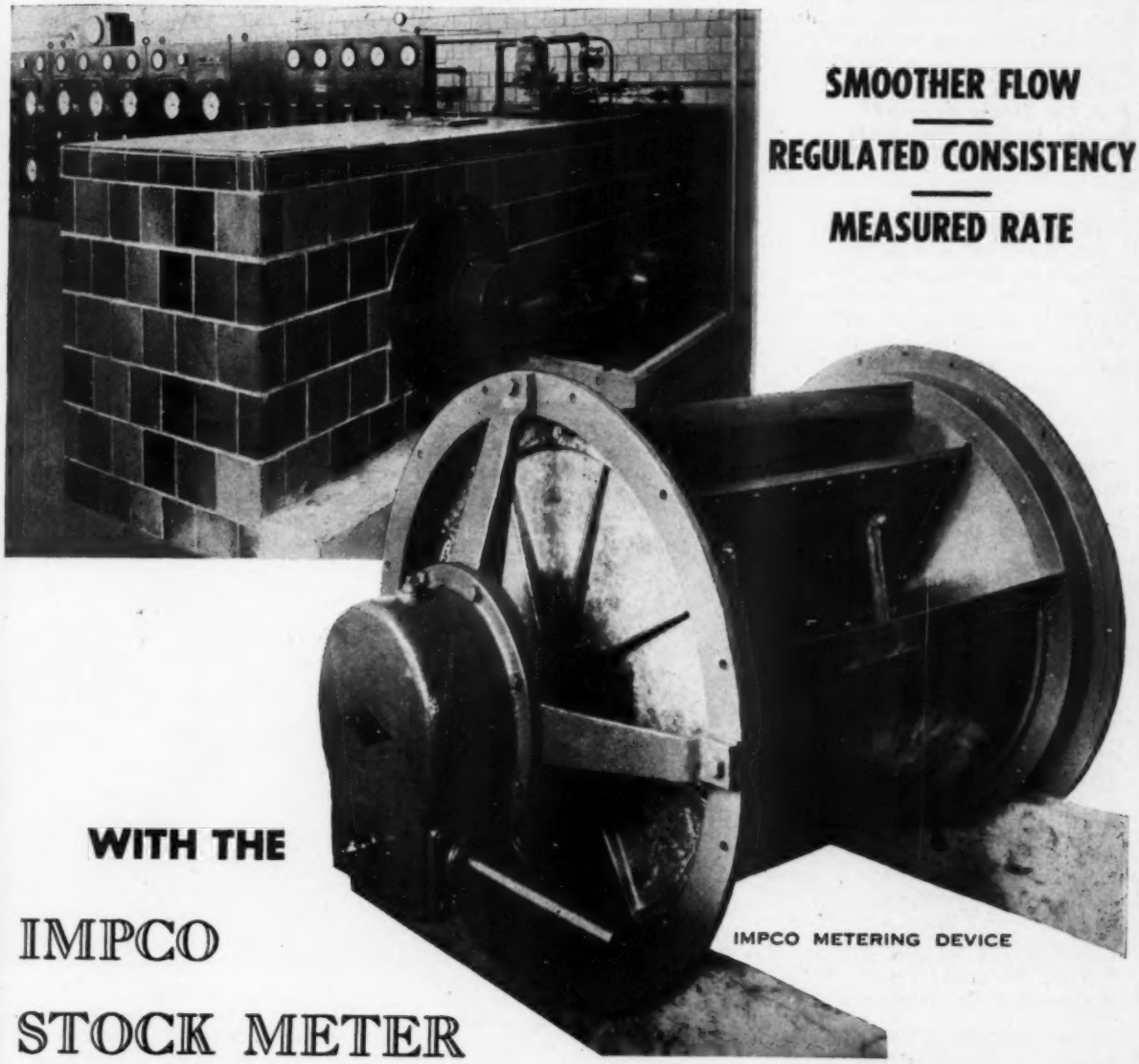

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P.M.C. Division, and more recently was manager of the Engineering Sales Div. of Bulkley Dunton Pulp Co. Mr. Herman Berg, who has joined the staff as sales and service engineer, has been associated with Sveen-Pedersen Save-all since its introduction to the United States, and is also well known in the industry.

I. P. Co. Elects Kay and Savage as Vice Presidents

At a recent meeting of the board of directors, International Paper Co., New York City, elected Stuart E. Kay and F. Henry Savage vice presidents.

Since 1936, Mr. Kay has served as manager of manufacturing, Northern mills, and Mr. Savage was appointed the first of this year to the position of assistant general sales manager. Both will continue their present responsibilities.

Ralph N. Isaac has been named general sales manager for Canada for Dixie Cup Co., Easton, Pa. Mr. Isaac replaces *Vern Mahoney*, new Metropolitan New York sales manager, in the post.

Winthrop M. Crane, Jr., was among several directors elected recently at the annual meeting of Eaton Paper Corp., Pittsfield, Mass.

F. W. Young, president and general manager of Canada Foils, Ltd., has been elected president and managing director of Modern Containers, Ltd., Toronto, Ont., Canada.

Joseph F. Morrison has been elected vice president in charge of sales of Beach & Arthur Paper Co., Modena, Pa.

L. A. Palmer has been elected a director of the Donnacona Paper Co., Ltd., Donnacona, P. Q., Canada.

Ralph G. Johnstone has been appointed vice president and general manager of St. Raymond Paper, Ltd., Montreal, Canada.

D. O. Wynocker to Assist Chas. Walker in Enlarged Sales Area—Libbey-O-F

Announcement has been made by the Plaskon Division of Libbey-Owens-Ford Glass Co., Toledo, Ohio, that Donald O. Wynocker has been named to assist Charles Walker in a newly expanded sales area.

Mr. Wynocker will assist Mr. Walker in covering Ohio, Michigan, Indiana, Pennsylvania, New York, and the New England states for the company's glues and industrial resins.

Mr. Wynocker, associated with the Plaskon Division since 1943, has been employed in the division's research and technical departments, where he has been concerned with industrial resins and glues.

Clarke K. Walter has been named manager of the Display Division of River Raisin Paper Co., Monroe, Mich. He has been production superintendent of the Division since 1947. Another appointment announced concurrently, was that of *Warren M. Pellot*, of the Cost Department, as assistant secretary-treasurer of the company.

Harold L. Mitchell, director of the Central States Forest Experiment Station at Columbus, Ohio, has been appointed director of the Southern Forest Experiment Station at New Orleans. He will be succeeded at the Columbus station by *Philip A. Briegleb*, who has been chief of the Division of Forest Management Research at the Pacific Northwest Forest Experiment Station, Portland.

James G. Stahlman was named a director of the Coosa River Newsprint Co. at the firm's annual stockholders' meeting held recently at Coosa Pines, Alabama. Mr. Stahlman succeeds *E. K. Gaylord* in the position. All other officers and directors of the company retain their earlier positions.

Edmund J. Farina, vice president of sales for Fibreboard Products, Inc., was chosen a member of the company's board in a recent election which also made *Robert E. Bundy*, vice president in charge of production, a board member.

Lloyd C. Dick has been promoted to junior industrial engineer at the Lockland, Ohio, plant of the Gardner Board and Carton Co.

Irving M. Footlik has been appointed materials handling consultant of Stone Container Corp., Chicago. In his new capacity, Mr. Footlik will supervise materials handling for the company's box plants and paper mills and will counsel the company's customers on efficient methods of handling corrugated boxes.

Clarke K. Walter has been appointed manager of the Display Division of River Raisin Paper Co., Monroe, Mich. *Warren M. Pellot* has been appointed to the position of assistant to the secretary-treasurer, *J. W. Walter*.

Robert C. Gaynor and *James V. Durham* have been appointed to the sales staff of the paper container division of Continental Can Co., New York. Mr. Gaynor will represent the Division in the Ohio territories, working from the Cleveland office; Mr. Durham will cover the Illinois, Ohio, Indiana, Kentucky and Southern markets.

R. W. Grott, Jr., of the J. O. Ross Engineering Corp., New York City, has joined the engineering staff of the company's Los Angeles office. Mr. Grott is a graduate of M.I.T., and has been a member of the Ross staff in Boston.

G. Gordon Hertslet has been chosen head of the newly formed Customer Public Relations and Advertising Departments of Gaylord Container Corp., St. Louis. Mr. Hertslet, former account executive with Oakleigh R. French and Associates, St. Louis advertising agency, assumed his new duties on June 1.

Arthur J. Uhlenbrock, assistant traffic manager of The Gardner Board and Carton Co., Middletown, Ohio, has accepted the position of traffic manager of Dairypak, Inc., Cleveland. Dairypak is owned jointly by Gardner and The Champion Paper and Fibre Co., Hamilton, Ohio.

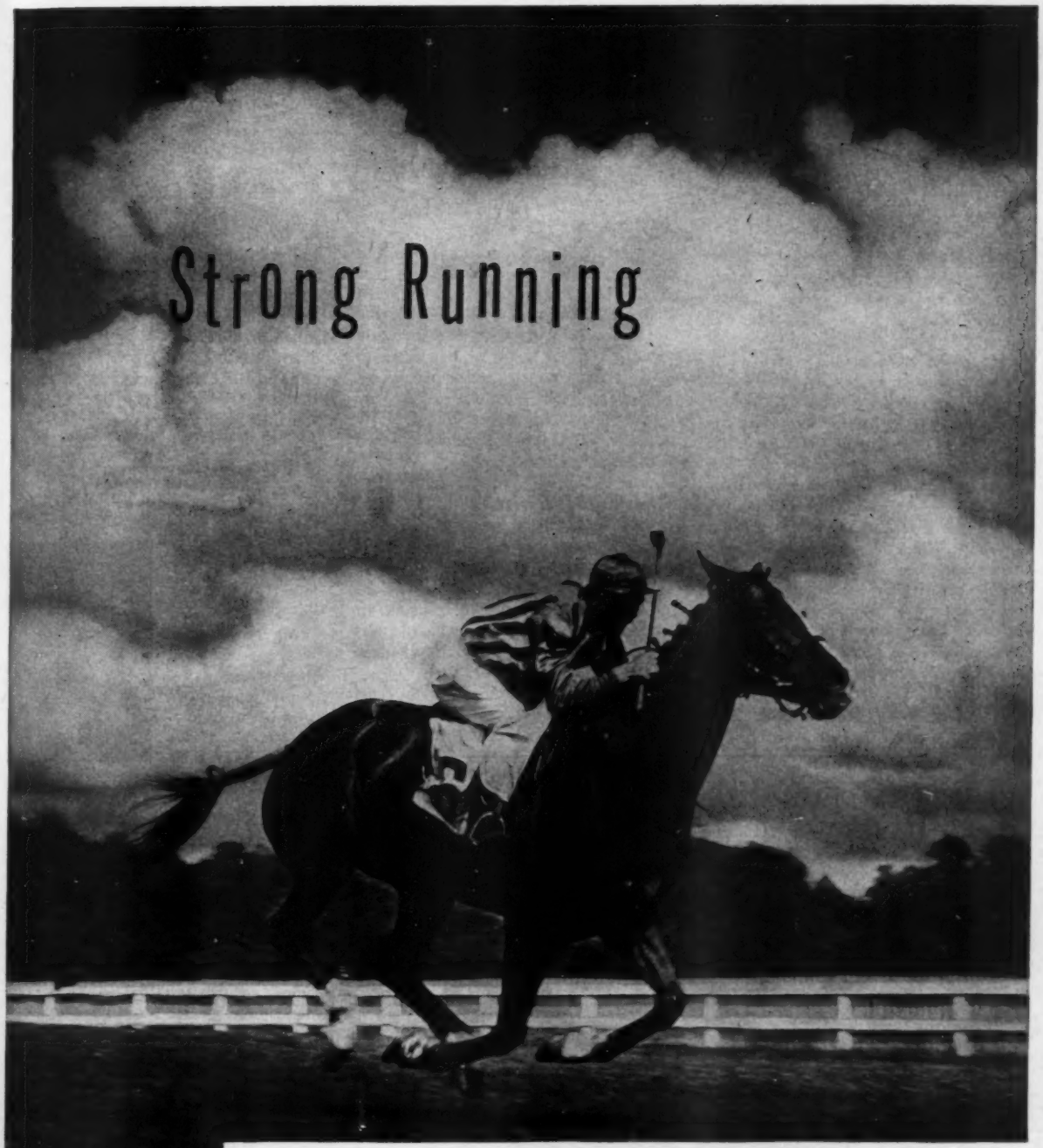
George M. Pennock has been appointed director of export engineering for Black-Clawson Co., Middletown, Ohio. He will be assisted by *Gilbert Kohr*, a graduate of the Shartle apprentice engineering program and associated with the Shartle and Black-Clawson engineering departments for the past six years.

W. Barclay as chairman, *M. J. Foley* as president, *R. W. Foote* as vice president, *R. G. McHugh* as manager, *R. C. MacKenzie* as treasurer and asst. secretary, are new officers appointed by Powell River Sales Co., Vancouver, B. C.

Kenneth E. Stover has been named foreman of the retail box finishing department of Gardner Board and Carton Co., Lockland, Ohio. Concurrently, *Michael J. Cecardo* was appointed foreman of the company's retail box printing department.

Robert F. Lamb, a sales engineer in the Esterline-Angus factory offices for several years, has filled that firm's Western New York engineering and sales post left vacant with the recent passing of *Dean Thomas*.

L. A. Keeler, vice president, director and comptroller of Fairbanks, Morse & Co., Chicago, for the past ten years, has retired after 39 years of service to the company. Ceasing other Fairbanks, Morse activities, Mr. Keeler is planning an extensive vacation.



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The Paper Industry Necrology

Louis Bloch

At his home in San Francisco, Louis Bloch, chairman of the board of Crown Zellerbach Corp., passed away June 12. He was 75 years of age.

Mr. Bloch was one of the founders of the pulp and paper industry on the Pacific coast, having started in a small paper bag factory of the Crown Paper Co. in San Francisco in 1894. By 1895, he had become superintendent, and shortly thereafter was made assistant to the secretary and general manager. When the Floriston (California) Pulp and Paper Co. was organized in 1899, he had charge of most of the purchasing for the construction of the mill. In 1910, he became vice president and general manager of the Crown Columbia Pulp and Paper Co. When that company was consolidated with the Willamette Pulp and Paper Co., Mr. Bloch was made vice president and general manager of the new Crown Willamette Paper Co. In 1924, he was made president of that company and on the formation of Crown Zellerbach Corp. in 1928, he became board chairman. He was for many years chairman of the board of Pacific Mills, Ltd., which company he helped to organize and which later was acquired by Crown Willamette Paper Co.

Survivors include the widow and two daughters.

Charles W. Rivise

Long active in the work of the Technical Association of the Pulp and Paper Industry, Charles W. Rivise passed away suddenly on April 25, 1951. He was one of the casualties resulting from an air accident when the plane in which he was a passenger collided with a naval plane over Key West, Florida.

Mr. Rivise was well known in legal circles, particularly in matters connected with patents, trade-marks, and copyrights. He was in active practice as a member of the firm of Caesar & Rivise of Philadelphia from 1927 to the time of his death.

He was recognized as an authority on Patent Law, gave lectures on the subject before legal groups and technical societies. He had written books and articles dealing with Patent Law, all of which are recognized as standards and used as textbooks in law schools. He was a member of many groups and societies. In addition to TAPPI, he belonged to the American Chemical Society and the American Institute of Chemists. Mr. Rivise was born in Russia in 1899 and came to the United States as an infant. He attended several universities from which he obtained degrees.

William M. Powell

Suddenly, on May 14, William M. Powell, president of the Diamond Manufacturing Co., Wyoming, Pa. (near Wilkes-Barre) passed away at the age of 58.

Wm. M. Powell

Mr. Powell also was president of the National Association of Perforated Metal Manufacturers, secretary-treasurer of the Powell Engineering Co., of Wilkes-Barre, and president of the Luzerne County Branch of the Pennsylvania Manufacturers Association. He was a veteran of World War I, and was a leader in many community activities.

F. Paul Birk

Consulting engineer F. Paul Birk, with offices in Chicago, passed away suddenly June 19. He was 50 years of age.

Mr. Birk was well known in the paper industry having worked as chief engineer with James L. Carey for a number of years. Following Mr. Carey's passing, Mr. Birk continued in the work for several years and in 1947 established his own business.

Mrs. Birk survives, and resides at their home in Glen Ellyn, Ill.

John N. Bergstrom

Well known in the paper industry, John N. Bergstrom passed away June 20 at his home in Neenah, Wis. He was 77 years of age.

One of the founders of the Bergstrom Paper Co., Neenah, Mr. Bergstrom retired as president in 1949 because of ill health. He was a trustee of Lawrence College, Appleton, Wis.

He is survived by his widow.

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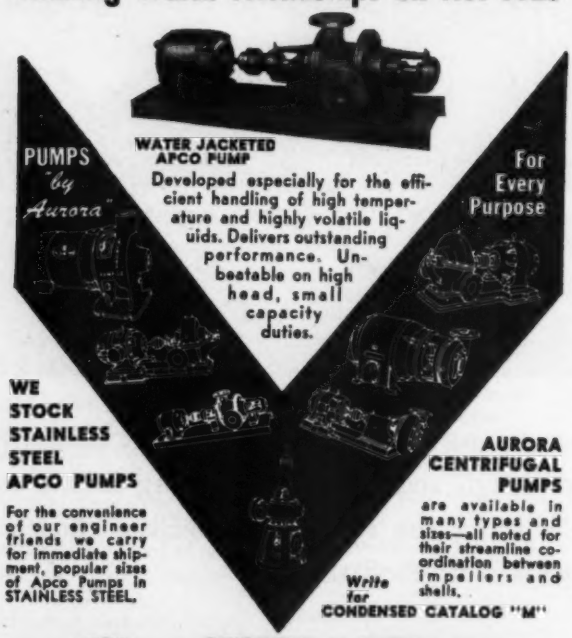
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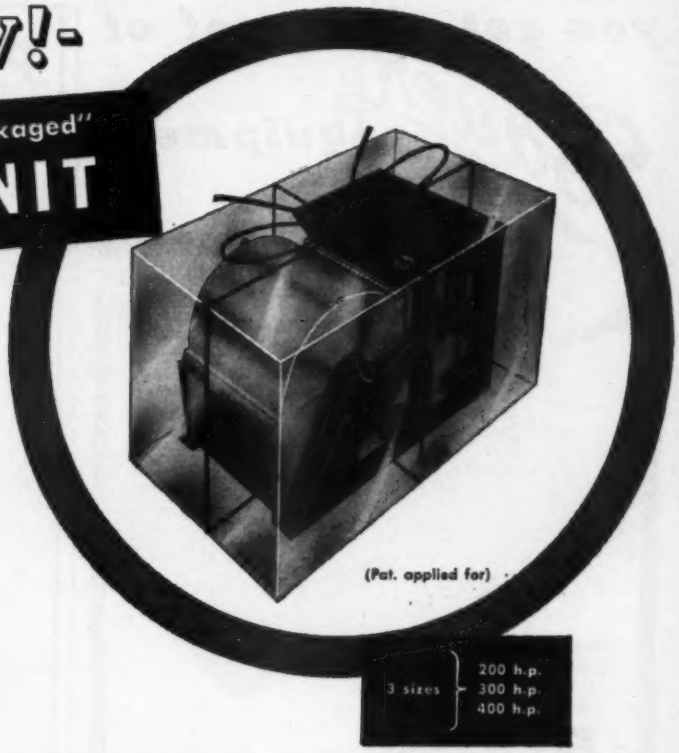

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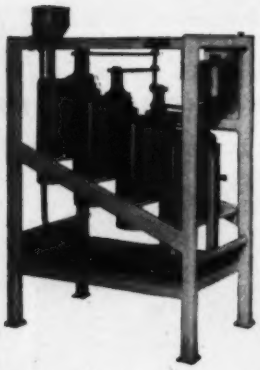

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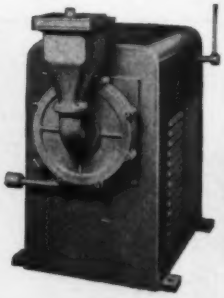

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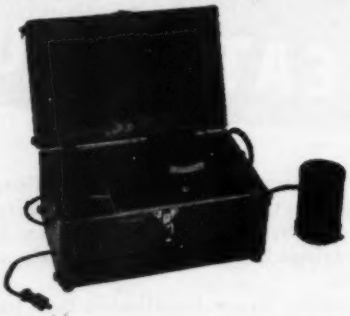

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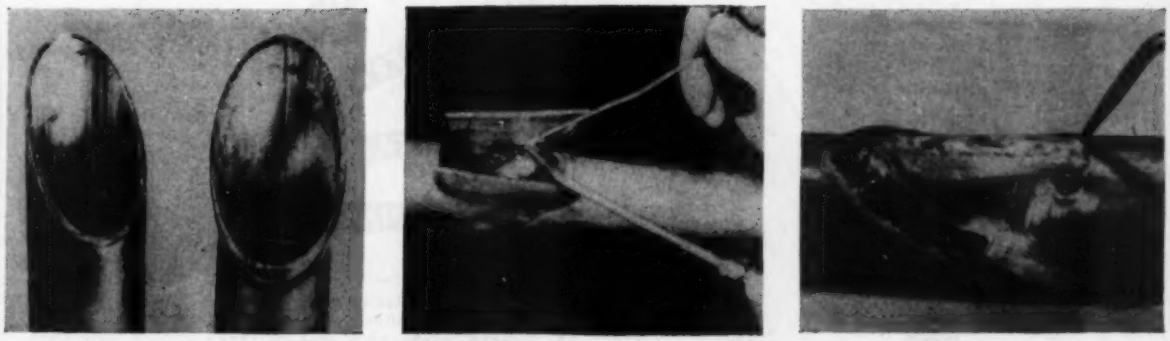

Fig. 2—How to make a split lap joint to avoid overhead welding in position

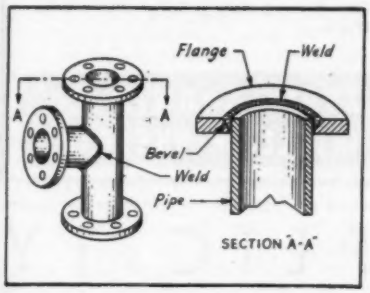

Fig. 1—How to make a flanged joint

Making lead pipe joints

Welded lead piping systems are made by following the same general layout methods used for piping systems of welded steel. You can buy lead pipe fittings in a variety of sizes and weights. Special fittings can be made by cutting sheet to size, shaping ("bossing" or "dressing") it on wood or metal forms, and then welding the longitudinal seams.

These instructions show you how to make several common joints in lead pipe. With a little practice these joints will be fairly easy to make. One of the most important instructions is to clean the joint and welding rod thoroughly just before you begin welding.

To prepare for butt welding lead pipe you can use special designs or follow the same joint design you use for steel pipe. Bevel the edges and line up the pipe in an angle or channel iron. Then make several tack welds around the joint. When they cool, begin welding the beveled edges of both pipes. The illustrations show how to make other common joints in lead pipe.

Flanged joint (See Figure 1)—Make flanges from lead sheet to slip over the outside of the pipe. Bevel the inside of the ring. Slip the ring over the pipe, then weld.

Slip lap joint (See Figure 2)—To avoid overhead welding in position, use this joint design. Cut the edges at an angle, then flare the tee-slot at the female end. (Center) Fit the pipe together, bend out the edges, and start to weld at the bottom on the inside. Continue up the sides as shown here. (Right) When you finish welding the bottom of the joint, bend the flaps back into their original position. Then weld the flaps of the joint from the outside.

Cup joint (See Figure 3)—Bevel the male end (left) and flare out the female end. Make the overlap at least three times the thickness of the pipe wall. Play the flame well down into the flaring and melt both walls around the joint. (Center) After you weld completely around the joint, wire-brush the weld. Then fill the joint with rod to the end of the flaring. (Right)—how joints should look. Pipe on left was cut after the first weld was made. The pipe on the right was cut after joint was filled with rod.

—From *Linde Tips*, published by Linde Air Products Co.

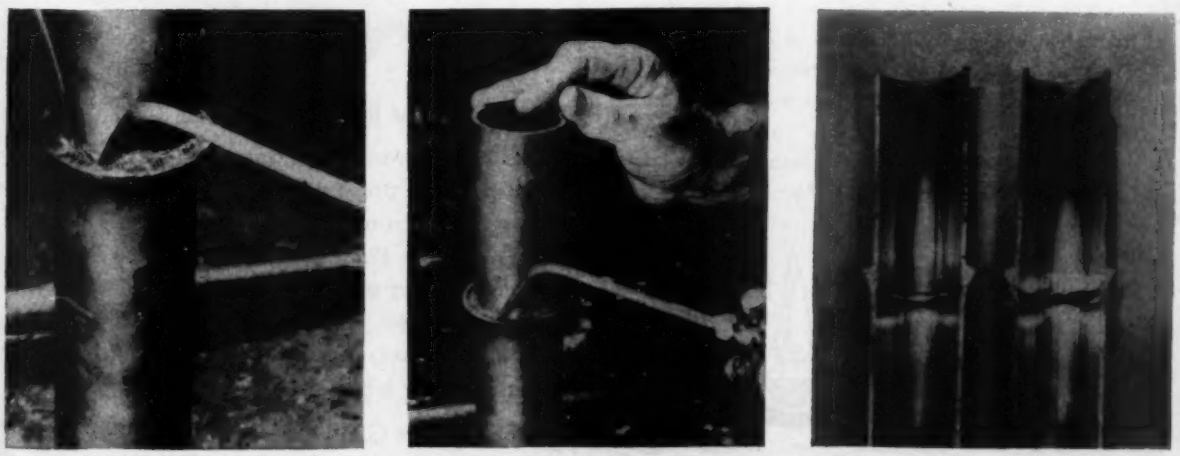

Fig. 3—How to make a cup joint in lead piping systems

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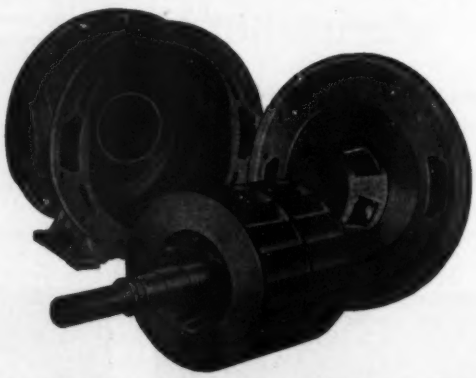

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Foreign Abstracts . . . . . .

Microbiological problems in the pulp and paper industry

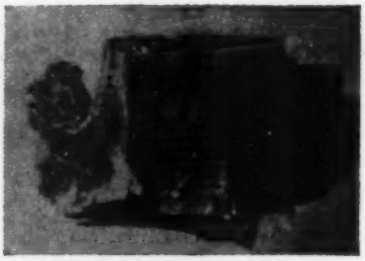

Fig. 1—Effect of fungus on pulp sheets

The stability of wet pulp while in storage and slime formation paper mills are discussed. As examples of damage to stored pulp, a number of organisms and their effects are discussed. Mold fungi are often offenders and over one hundred species have been isolated from samples of wet pulp. Typical examples are *Pullularia pullulans* (causing blue stain); *Tricoderma* and *Penicillium species* (causing green stains) and *Cladosporium cadopora* or *Stempylym* (causing dark stains). Rot fungi affect pulps in a different way. These can degrade cellulose and lignin and during long storage may reduce pulp strength, and at times cause complete destruction of the fiber. Some of these degrading fungi are discussed at length.

Figure 1 shows the effect of the rot fungus *Lenzites sepiaria* on pulp sheets after two months and indicates the growth of fruiting bodies. Inasmuch as fungi require oxygen, water, adequate food, a suitable temperature, and *p*H, and absence of substances toxic to their growth. Whereas mold fungi do not develop in bales consisting of even pulp sheets (thus reducing the volume of air) but rot fungi develop even under these conditions, unless special steps are taken to keep the bale under pressure during storage. The fungal growth ceases when the "dry content" of pulp approaches 75%. This is a practical means of preventing fungal growth but the buyer suffers from difficulties in breaking up the pulp (which obtains when the pulp is wet). With regard to food requirements, the fibrous material is usually a poor substrate and mycelia cannot develop in great quantity. Competition for food offers the opportunity of introducing into the pulp a harmless organism in large quantities. However if such an organism dies, the foodstuffs of its cells are placed at the disposal of the harmful fungus which can then develop further. When mill temperatures are between 45 and 60 C. (in a mechanical pulp mill), the danger of fungal growth is especially great. Pulp can probably not be preserved adequately by changing the *p*H (to the alkaline side). Above *p*H 8, the color of the pulp is adversely affected and at about *p*H 7, certain fungi can grow satisfactorily. The use of phenylmercuric acetate (20-25 grams per ton of wet pulp) as a satisfactory fungicide is discussed at some length. The most resistant of the fungi was *Coniophora ceribella*, which stood 2-3 times as much of the poison as did most of the other fungi. Slime formation (i.e. from both fungi and bacteria) is fully discussed.

A series of experiments under circumstances which correspond to the situation in mill system during a slug dosing were carried out. The experiments were made both with 2% mechanical pulp and without any fiber material present. A suspension of *Bacillus subtilis* was subjected to the influence of phenylmercuric acetate solution of known concentration for a certain time, after which samples were taken and transferred into a food substrate without fungicide, where the bacteria could grow if they had preserved their vitality. Both the fungicide concentration and the time factor were varied. From these experiments the author hoped to find answers to the following questions:

1) How does the fiber affect the toxicity of the solution?

2) What combination of the fungicide concentration and time is necessary to render the bacteria harmless?

It was discovered that no difference existed between the experiments carried out with and withoutfibers. The fungicide adsorbed by fibers is consequently not inactivated but is as toxic as the unadsorbed part of the substance. Experiments with varying fungicide concentrations showed that 3-5 mg. phenylmercuric acetate per liter killed practically all bacteria. A complete sterility is not achieved even with 20 mg./liter because part of the bacteria is in spore form. Spores of bacteria are clearly insensible to a slug effect of short duration, but the phenomenon is probably without practical importance because these spores, if they start to grow, are killed at the next dosing. It transpired, provided the fungicide concentration was adequate (3-5 mg./liter), that 5-10 minutes was sufficient. If the fungicide concentration was below the above mentioned value, satisfactory results could not

Carbohydrates in wood pulps

The authors give details of the quantitative determination of the carbohydrate composition of (hydrolyzed pulps) by means of paper partition chromatography. Special stress is laid on the distinction of sugars in the hydrolysis preceding the chromatographic separation. The pentosan value (obtained by the furfural procedure) is approximately one per cent higher than those obtained chromatographically. The compositions of various types of pulps (bleached and unbleached sulphite and unbleached kraft pulps) with both low and high degrees of cooking have been determined. The composition of these pulps varies depending on the raw material and methods of production (acid or alkaline cooking and prehydrolysis) but is relatively little affected by variations in the degree of cooking or by bleaching. Significant data are given in Tables 1 and 2.

Jacobus Sundman, Jouko Saarnio and Charley Gustafson. *Paper and Timber* (Finland) 33, Special issue, No. 4a (1951) (In English).

TABLE 1—Carbohydrate composition of sulphite pulps

	Unbleached pulp					Bleached pulp			
Wood	Tingle number	Pentosan, % on lignin-free pulp	Glucosan %	Mannan %	Xylan %	Pentosan, % on lignin-free pulp	Glucosan %	Mannan %	Xylan %
Spruce	10.4	6.2	89.5	6.3	4.2	5.9	87.6	7.8	4.6
Spruce	4.1	5.7	90.1	6.0	3.9	5.4	90.9	5.4	3.7
Pine	8.8	—	86.2	7.7	6.1	—	—	—	—
Aspen	6.2	11.8	88.0	2.1	9.9	10.5	87.9	2.5	9.6
Aspen	3.2	10.0	90.4	2.0	7.6	8.8	92.0	1.6	6.4
Birch	9.3	17.7	83.4	1.4	15.2	16.2	85.7	2.2	12.1
Birch	4.7	14.8	87.5	1.5	11.0	13.9	87.5	1.9	10.6

TABLE 2—Carbohydrate composition of unbleached sulphate pulps

Wood	Tingle number	Pentosan, % on lignin-free pulp	Glucosan %	Mannan %	Xylan %	Araban %
Spruce	11.4	—	84.4	4.7	9.9	1
Pine	8.4	11.1	84.4	5.6	9.0	1
Pine[1]	5.3	—	92.8	2.8	4.4	0
Pine	4.5	7.0	88.3	5.9	5.3	0.5
Birch	13.3	28.6	74.5	1.2	23.8	0.5
Birch[2]	5.8	—	72.6	1.5	25.9	0
Birch[2]	5.4	—	82.8	0.5	16.8	0
Birch	5.0	26.2	76.4	1.2	22.4	+

[1]Prehydrolyzed . . . [2]3% Elementary sulphur in cooking . . . [3]Prehydrolyzed.

be obtained even after a treatment of 45 minutes.

To judge the value of the data presented here it must be remembered that the experiments wre carried out with a culture of *Bacillus subtilis* suspended in water, while in the mill one must deal with various organisms that are not freely suspended in liquid, but are in the slimy layers on the channel walls. The experiments should be complemented, therefore, by investigations in the *mill* where (instead of the suspended bacteria) the slime layer on the wood panel of a slime counter is, during varying time periods, subjected to fungicide solutions of known concentrations.

The quantitive course of adsorption of mercury was studied by means of adding the fungicide to a 2% suspension of mechanical pulp, and thereafter determining the mercury content of the clear water separated from the fibers. The adsorption equilibrium depends on the acidity of the solution. In order to make possible to determine the distribution of mercury in a mill a modification of the ditizone method that will probably be simple and swift enough to be useful in mill control has been worked out. The investigations will be reported later. 11 References. G. O. Gadd (Biochem. Dept. Research and Testing Institute of the Finnish Pulp and Paper Industry) *Paper and Timber* (Finland) 3, 49-52 (1951) (In English)

Scattering coefficients of fillers in suspension

Using the Kupelka-Munk, and Gurevic equations for calculating scattering power, the authors have determined the scattering coefficients of fillers, from transparency and reflection values of filler suspensions. These values were then corrected to correspond to the scattering conditions in air, and various sources of error are discussed. So as to partially eliminate the influence of such errors, the final value of the scattering coefficient (S') was calculated from the increase in scattering power caused by an increase in the filler concentration of the suspension. The S' values of seven different china clays were determined, using three different sample holders (of varying thickness) and, besides water, (as suspension medium) varying mixtures of water and glycerol.

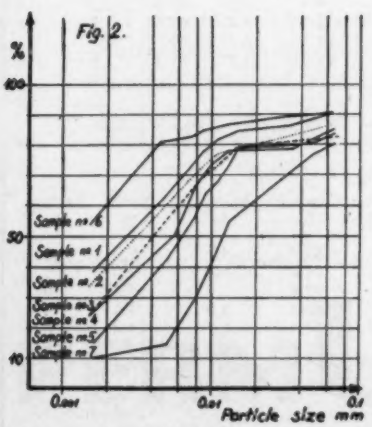

Fig. 2—Particle size distribution curves

Details are given for determining the reflectance and transparency, and mathematical calculations are discussed fully. To effect an adequate comparison, the values obtained by the optical method were compared with particle size distribution values obtained by Casagrande's sedimentation technique, and values by the latter technique were plotted (cf. Figure 2).

The sedimentation procedure graded the seven samples in very much the same order as did the optical procedure. Since the latter is less laborious, it is probable that the optical method could be used in place of the sedimentation method as a routine method for evaluating filler quality. Furthermore, the optical method permits this quality to be expressed as a single number which is closely related to the opacifying power of the loading agent. Eight references are given. The article is a contribution from the Research and Testing Institute of the Finnish Pulp and Paper Industries, Helsinki. Charley Gustafsson, Lars Nordman and Toivo Rissanen. *Paper and Timber* 32, No. 11, 325-328 (1950).

Electrical resistance of papers

A halftone and schematic sketch show equipment built for the School of Papermaking at Grenoble for measuring the transverse resistance of paper. A suitable (humidity conditioned chamber) houses a metal framework which supports an upper electrode. This consists of an aluminum cylinder, whose highly polished accurately measured lower surface (*ca.* 30 sq. cm.) rests on the test sheet. This electrode is protected by an outer guard ring which prevents current deviations. The lower electrode is an aluminum foil (9 microns in thickness) resting on several soft sheets of paper. To insure a suitable pressure, a stirrup supporting a suitable weight is hung from the upper electrode (but is otherwise unsupported). The technician can make determinations without opening the chamber or disturbing the equilibrium of the system.

Prior to testing, samples are conditioned in the chamber. The current is recorded in microamperes per sq. cm. (of electrode surface) for varying time periods. The current is then discontinued, and the test repeated after a suitable time interval. In the example given by the author, the sample used was sulphite pulp, 0.05 mm. in thickness; the measurements were made at 65 deg. relative humidity and 50 volts. Wide variations in amperage were noted, results were not reproducible and often there was a gradual current decrease—the final values (after 5 minutes) ranging from 0.58-0.69 microamperes. The deviations of transverse resistance could not be ascribed solely to improper sheet formation, because specially prepared condenser papers showed similar variations. These discrepancies are discussed at some length.

The author concludes that the electrical resistance of a paper sheet is due to air contained therein, and to the concomitant restriction in interfibrillar contacts. Electrolytic phenomena may also contribute to the electrical conductivity of the sheet (but not at low voltages). Changes in resistance with increasing voltages are discussed, but the author admits difficulties in interpreting his transverse resistance data. Surface resistance of paper sheets was also measured, and a sketch (but no full description) of the apparatus is given. In this case, the measurements were far more reproducible (to within 10%), and the resistance apparently conforms to Ohm's law. R. Seve. *Bull. assoc. tech. ind. papetiere* 5, 49-56 (1951) (Original in French).

Opacity of papers

The author gives a survey of general factors determining the opacity of paper. Light scattering is not only caused by repeated macro-optical reflection and refraction (Figure 1), but also by optical effects caused on a submicroscopic scale by very small particles (or inhomogeneities in structure). Calculations show that the refractive index of the fibrous material of technical pulps probably varies within such narrow limits that the light scattering is not affected. The opacity will be determined primarily by the amount of optically refracting surfaces and the size of the submicroscopic particles in the paper.

It is claimed that such optically refracting surfaces not only occur on the surfaces of the fiber, but that account must also be taken of the capillaries and micro lumina within the actual walls of the fiber. Thus

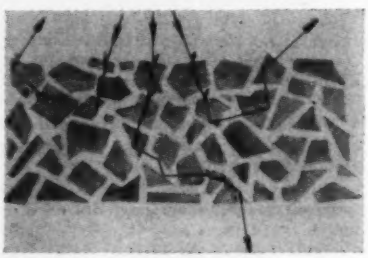

Fig. 1—Light scattering due to repeated macro-optic reflexion and refraction in a layer of transparent particles of irregular form.

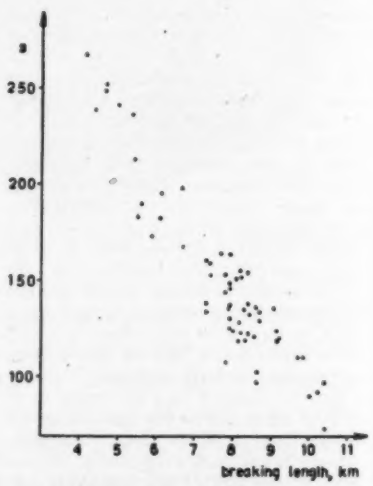

Fig. 2—Correlation between breaking length and scattering coefficient, s, for a wide range of technical sulphite pulps, both beaten and unbeaten. The pulps were beaten in the Lampen Mill; sheets made according to the Swedish method with a pressure of 15 kg/cm².

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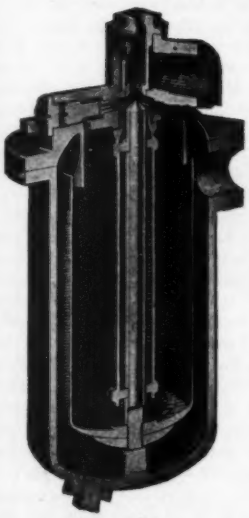

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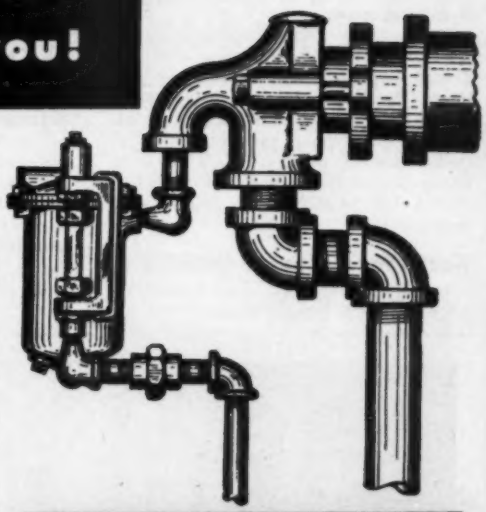

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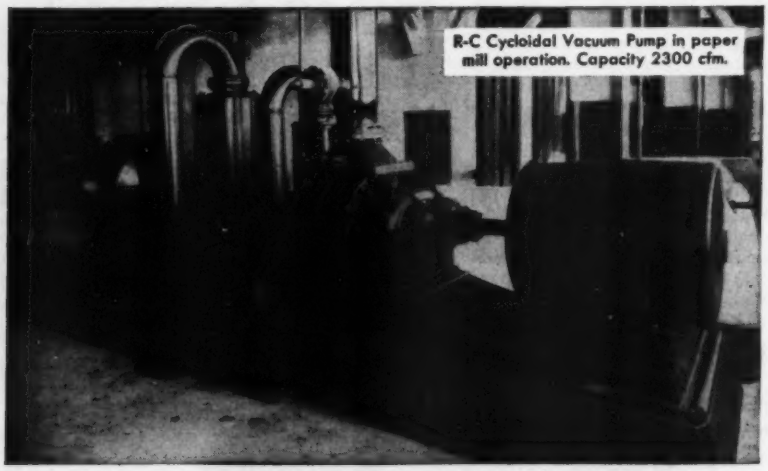
opacity depends on the size of the fibers and on their fine structure. Furthermore, there appears to be a close correlation between the density and strength of a paper and its opacity. The greater the breaking length, the lower the scattering coefficient (Figure 2), in carefully prepared test sheets. The author also discusses the manner in which opacity may be influenced by cooking, bleaching, drying, and beating. Further studies are in progress. Hans Wilhelm Giertz. *Svensk Papperstidn.* (1951) No. 8, 267-74 (in Swedish, with English summary).

Kaolin for the paper industry

In most cases, kaolin must be purified prior to its use in papermaking. The following tests for kaolin are described: moisture content, loss on ignition, color, particle size, sedimentation, bleachability, specific gravity, and retention. A method for determining particle diameter (based on Stokes law) is outlined. A special technique is given for preparing thin sections of mixtures of kaolins with other compounds, and for differential staining. Tests for the presence of adulterants, and for "bleaching" with hydrochloric acid and with sodium sulphide followed by hydrochloric acid, are given. Removal of iron is also mentioned. Horacio Llambías and Renato Mario Sanromá. *Argentina Instituto Technologico* Series A, No. 3, 15 pp. (1950) (Original in Spanish). Through *Bull. Inst. Paper Chem.* 21, No. 7, 460-61 (1951).



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Phenols in Swedish pine heartwoods

The content of pinosylvin in the heartwood of 269 Scotch pines from all parts of Sweden was estimated by a roughly proximate colorimetric method (which is fully described and which depends on the formation of a red color produced by the interaction of the phenol with diazotized benzidine). In general determinations were made on circular sections cut from the lower, the central and top portions of the trunk. The average pinosylvin content for pines from all Sweden is about 0.9%, and the phenols are evenly distributed along the axis of the tree trunk, but are generally greater at the periphery of the heartwood (rather than at the center). These phenols enhance the durability of the wood and the red color intensity described above is roughly proportional to the durability of the wood. The phenol content was highest in pines from Southern Sweden and decreased to a minimum (about 0.76%) in Central Sweden (Province of Jämtland). Pines of the Northern area had a phenol content just below the average for the entire country. Altitude seems to have little effect on the phenol content, and in general, the percentage of phenol is surprisingly uniform. Only about 3% of all the Scots pines in Sweden have a pinosylvin content about 1%.

With slight modifications, the procedure may be suitable for field estimation of the durability of pine timber. The authors point out most of the pines now selected for seed production, or for reforestation purposes cannot be considered too suitable from the standpoint of durability. Probably the phenolic content is governed by genetic factors. Holger Erdtman, Adrian Frank, and Gösta Lindstedt *Svensk Papperstidn.* (1951) No. 8, 275-79. (In English).

Thermotechnical problems in sulphite pulp manufacture

A lecture dealing with recent developments in the drying of sulphite pulp and evaporation and combustion of waste liquor. The heat balance in a "strong" sulphite mill, which evaporates and burns its waste liquor, is discussed briefly. The author emphasizes the fact that the economic use of waste liquor as a fuel is so complex that it presents a specific problem for each mill. G. Edling. *Das Papier* 4, 438-45 (1950). (In German.)

Total energy requirements of the steamed, brown mechanical pulp process

The authors established the heat balance for a copper lined and a brick lined digester used in steaming spruce wood. The copper lined digester requires about 27% less heat than does the brick lined. Thermal requirements for steaming were converted into kilowatt-hour values which indicated that this steaming consumed one-third of the total power required in the entire brown mechanical pulping process; this is shown to be greatly superior (in its energy requirements) to the usual groundwood process. Walter Brecht and Wilhelm Kilpper. *Das Papier* 4, 462-7 (1950). (In German.)

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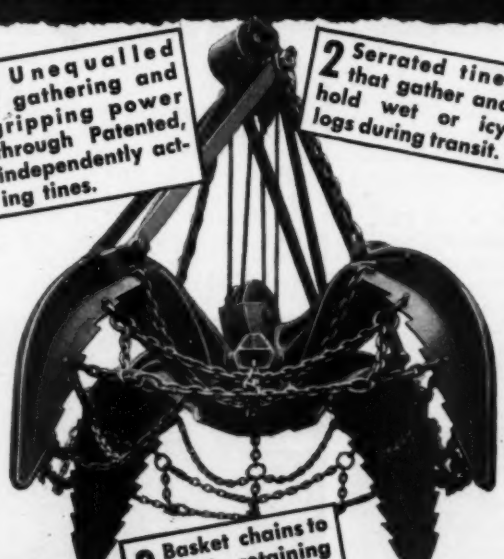

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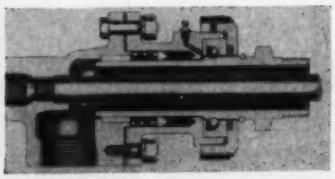

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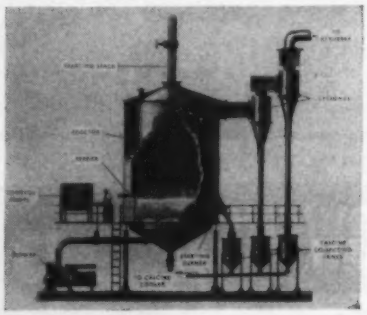
Brady Quik-Label Safety Signs are printed on extra strength cotton cloth and are applied in a few seconds without moistening. They may be used for either indoor or outdoor applications. These features, together with a wide range of hundreds of stock safety legends, make the Quik-Label line of interest to safety engineers in all fields.

Included in the line are danger signs of all kinds, directional signs, fire signs, first aid signs, and special signs made to order. All are printed on safety backgrounds and conform to ASA Standard Z35.1-1941 for Industrial Accident Prevention Signs, developed by the ASA and the National Safety Council. W. H. Brady Co., Dept. 361, Chippewa Falls, Wis.



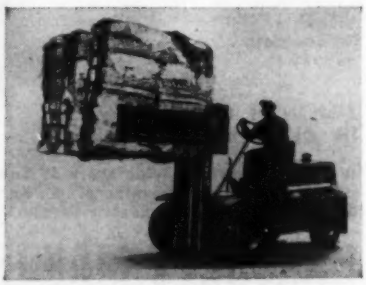
SO_2 Generating System

The production of sulphur dioxide from pyrite or pyrrhotite is made possible by the Dorrco FluoSolids System. This method of tapping an alternate source of SO_2 should be of interest as sulphur supplies become scarce.

Sulphur pyrite is roasted in the FluoSolids reactor, which has no moving parts. The manufacturer claims lower investment and operating costs than with conventional roasting methods. If properly used, SO_2 formation is kept to a minimum. For example, when roasting 48 per cent sulphur pyrite at 900 C. with a minimum of excess air, gas strengths up to 14 to 15 per cent SO_2 are obtained, and a maximum of 1½ per cent total sulphur is left in the calcine. Dorr Co., Barry Pl., Stamford, Conn.

Conveyor Chain

Designed for conveying sawdust, refuse, wood chips and similar materials, the Rex combination-type chain is built to handle assignments that might prove too tough for ordinary mill type chain. Yet it operates over the same sprockets and in the same troughs. Its extra strength is achieved by alternating steel with cast links and using larger diameter rivets and pins. Side bars of the steel links are of high-carbon steel. The cast links have wide wearing shoes which are tapered to avoid catching with possible damage to the conveyor. The barrels of the cast links have grease chambers, factory filled, which prevent "freezing" of chain joints, reduce wear and retard corrosion. The faces of the barrels are designed to act as scrapers so that material will not pack in the trough. Chain Belt Co., Dept. PR, 1600 W. Bruce St., Milwaukee 4, Wis.



Heavy-Duty Clamp

For use on Clark Utilitruc lift trucks, the "Extra-Heavy Duty Clamp" handles heavy loads without use of pallets. The device is similar to the standard heavy duty clamp of this manufacturer, but is more ruggedly built with heavier slide arms and guides to permit increased arm travel. Clamp arms can be extended from a minimum opening of 24 in. to a maximum opening of 95 in. Over-all width of the clamp assembly with arms closed is 67 in.

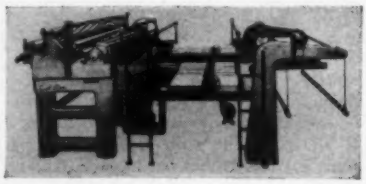
The clamp is not detachable and cannot be used interchangeably with standard forks. Clamp arms, however, are bolted to the slide arms, making them detachable and interchangeable with other types of arms. Several types of clamp arms are available for special needs. There is no loss of lift height with the new clamp, but machine capacity is somewhat reduced. Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

Beta Ray Gauge

Using radioactive materials, this new Beta Ray Gauge continuously records variations in weight or thickness of a wide variety of

moving sheet materials directly on the production line. Operation is extremely simple and consists of merely changing settings on two dials recessed in the console whenever manufacturing thickness specifications are changed. These dial settings are made with a calibration chart supplied with each gauge. No other adjustments are ever required, since causes of errors are eliminated periodically by automatic standardization.

The gauge will measure accurately and continuously to a few millionths of an inch without contacting the material being gauged. The material is run through a gap between a source of beta radiation and a radiation detector, preventing a portion of the source radiation from reaching the detector in proportion to the weight per unit area of the material. Readings directly in terms of thickness can be made on materials of constant density. Industrial Nucleonics Corp., 1205 Chesapeake Ave., Columbus, Ohio.



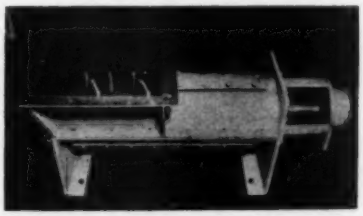
Cutter-Layboy

A complete line of cutter-layboys has been designed to meet all types of service. Based on study of cutting operations in many plants and mills for purposes of simplification, the line embraces three basic types, each available in a complete range of sizes usually employed for the service for which it is intended. Illustrated is a simplex model, for high-speed precision single or multiple sheeting in finishing room service. Other types are for heavy-duty and for economy service.

All three types employ the patented self-sharpening Clark-Aiken "Spiral Shear" cylinder knife which cuts with a scissors action, insuring clean, sharp edges on any type of stock. Rolls are of larger diameter than heretofore used, and provide greater gripping service. Draw rolls are sand-blasted to further guard against slippage. Other innovations are scale marking on the slitter shaft and joggers, permitting accurate setting without use of tapes; and delivery tapes much thicker than usual, with a ratchet device for tension adjustment. Clark-Aiken Co., Lee, Mass.

Plastic Coating

A plastic spray, now being made in pilot plant production by U. S. Rubber Co., will soon be marketed under the name U. S. Royalguard protective coating. It is expected to find use in chemical processing, rayon and cellophane production, pulp and paper manufacturing and other industries requiring protection of structural steel against corrosive chemicals and atmosphere. The plastic combines high film flexibility with good adhesion and impact resistance. It will not chip or crack, and it can be used on steel, aluminum, concrete, hardwood or composition board. It requires no primer and can be produced in a variety of colors. Since it contains no chemical plasticizer to leech out or harden, it retains its flexibility throughout its service life. United States Rubber Co., Providence, R.I.



Crusher

A rotary crusher known as the Prebreaker is said to replace in many applications hammermills, shredders and other crushers. It has a high capacity at low speed, due to its simple, extra strong construction. High torque is obtained at relatively low speed.

Prebreakers are available in five sizes, ranging from 10 to 100 rpm, and in ½ to 100 hp, 6 in. to 18 in. rotor diameter, and 10 in. to 48 in. effective length. All models, including special designs, are made in both carbon steel and stainless steel to meet users' specific needs. Rietz Manufacturing Co., 441 Folsom St., San Francisco 5, Calif.

Dual Belt Motor

Part of a standard Varidrive line is a new series of extra heavy duty motors for variable speed with ratings as high as 50 hp. To carry the heavy load through the internal speed changing transmission, dual

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variabelts are used, thus distributing the load so that no undue strain is imposed. To counterbalance belt load, tension control known as Autotaut has been designed. This principle employs a calibrated spring to maintain pressure between the two halves of the driven varidiscs and the sides of the belt. The spring takes up any slack that might be caused by stretch or wear of the belts. Use of dual belts does not affect the ease of changing motor speeds, which is accomplished by merely turning a control dial. U. S. Electrical Motor, Inc., 200 E. Slauson Ave., Los Angeles 54, Calif., or Milford, Conn.

Bucket Accessory

A "Power Bucket" accessory for the handling of bulk materials is now available on all model Hi-Duty lift trucks of the Transitier Co. The bucket has a capacity of 9 cu. ft. and is constructed of high tensile steel, with a special plow steel lip. It features flared sides and lip to facilitate clean-up along walls and into corners.

The bucket action is controlled by hydraulically actuated cylinders, thus eliminating "shock dumping." The bucket can be opened or closed at any desired height up to 7 ft. 10 in. on a 9-ft. mast, and through a full 90 deg. arc. Transitier Truck Co., Portland, Ore.

Hand Pumps

Five series of hand pumps, each in several models, incorporate the first major changes in the Blackmer line since 1945. Capacities have been enlarged, exteriors are restyled, and several models have been added. These pumps can be used for a wide range of dispensing, refueling or defueling operations. They are available in models as pumps only; with suction and delivery pipes for drums and skid tanks; with return drip-pan for barrel mounting; with refueling hose and nozzle; with floor stand for underground tanks; with brackets for wall or foot mounting; with locking device; and with changes of accessories for most combinations of the above models. Capacities are 7, 10, 14 and 28 gpm.

The new series are Nos. 210, 404, 414, 828 and 807. Blackmer Pump Co., 1809 Century Ave., Grand Rapids, Mich.

Process Heaters

Direct fired heaters for a wide range of process applications are offered in this line, with capacities from 100,000 to 15,000,000 Btu's per hour. The equipment is designed for high thermal efficiencies and trouble-free operation. Complete automatic control systems are available which largely eliminate operating attention. Temperatures range to 750 F. or above.

The heaters are recommended for any process requiring heat at temperatures above existing steam supply, including indirect circulating heating using heat transfer mediums, and direct heating of vapors and liquids. They may also be used to supplement existing boiler capacity, or for installation in remote plant locations to save cost of new steam facilities. Struthers Wells Corp., Warren, Pa.

Return Idler

Most belt damage from roving occurs at the edges on the return run, where the belt is closely confined between the frame and supports, and where it is usually difficult to observe. If the belt is centered entering the tail pulley, central loading is assured on the carrying run. The new Rex Style No. 33RA Self-Aligning Return Idler helps prevent belt damage from roving and helps center the belt without the use of side guide rolls.

It is mounted on a roller bearing turntable, with the entire assembly tilted 45 deg. in the direction of return belt travel; and it sensitively maintains an equilibrium at the center of the roll. The action is equally effective with horizontal, inclined or declined conveyors and is unaffected by build-up of material on the roll. The Idler can be supplied with 4, 5 or 6 in. diam steel rolls, and also with a 5½ diam. rubber-covered spiral roll. Chain Belt Co., Dept. PR, 1600 W. Bruce St., Milwaukee 4, Wis.

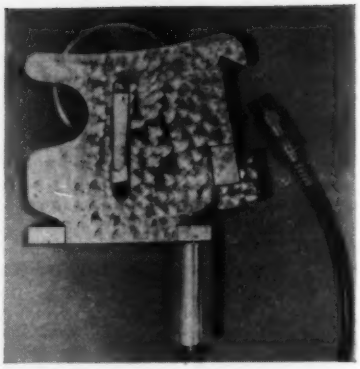
Wet-Strength Resin

Uformite 700, a new nitrogenous wet-strength resin, is said to offer excellent curing characteristics in a variety of pulps and over an extremely broad range of resin concentrations in the pulp. Whether at high or low levels of concentration, it is said to produce wet tensile strength economically, with rapid development of strength after the paper leaves the paper machine.

Heretofore high early wet strength has been possible only with resins requiring acid treatment and aging in special acid-resistant equipment. A major advantage claimed for the new resin is that it requires no special mixing procedures or equipment. It dilutes readily with water and is then ready for use. It may be stored in the same manner as are conventional liquid wet-strength resins.

It appears to perform well on bleached or unbleached, kraft and sulphite pulp. The amount added to the pulp depends on the amount of wet strength required and on conditions in a given mill. In general, from 0.15 to 3.00 per cent resin solids, based on pulp solids, is required. The resin produces the maximum wet strength when the *p*H can be reduced to 4.5 or below, but satisfactory results can be obtained at *p*H 5.0. The manufacturer recommends that for operation at values above 4.5, his laboratory make specific recommendations.

Data on mill trials and performance records under varying conditions are available. Rohm & Haas Co., Resinous Products Div., Philadelphia, Pa.



Slitter Lever

This slitter lever is air-operated and can be set to widths as narrow as ½ in. It is used on most of the newly designed winding equipment now being produced by Bagley & Sewall, Watertown, N.Y.

Electric Fork Truck

Features of the new Clipper, a battery-powered fork lift truck, include increased speed, 2000-lb. capacity at 24-in. load center, "fingertip" directional lever, automatic acceleration, "deadman" safety control, pivot-mounted steering axle and cushion-style tires as standard equipment. Smooth, error-proof operation is assured with the new steering and control features.

Dimensions of the new Clipper are: over-all length (less forks), 63⅝ in.; over-all width, 34½ in.; wheelbase, 37 in.; turning radius, 61½ in. minimum intersecting aisles, 57 in.; over-all height of standard uprights with forks down, 83 in. Maximum lift is 124 in., and over-all height at lift is 142½ in., with other uprights and tiering heights available. Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

Moisture Meter

The TAG Moisturonic Moisture Meter Model 8008 measures the moisture content of lumber, wood, plaster and many other materials of varying textures and consis-

tencies. Because the instrument has an overall range of from 2000 ohms to 20,000 megohms, and can be used with any material capable of accommodating electrode probes, it is possible to check the moisture content of many substances not readily measured heretofore.

The Moisturonic operates on the resistance principle and gives direct readings on wide "double-range" scales. It is available in two forms: A Wood Meter, with a scale calibrated for use with lumber, wood, plaster and wood products; and a linear scale model, with linear graduations for use with materials for which no calibrations have been made. Either battery operated or for use on 115 volts, 60 cycles a-c. Tagliabue Instruments Div., Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J.

Feeder Pump

The Model 2-47C Constaflo Chemical Feeder is a positive displacement, duplex diaphragm pump equipped with two "See-Thru" plastic reagent heads. It is driven by a ¼ hp motor, and recommended delivery range is from 1 to 15 gal. per hr.

The pump will draw solutions or slurries from a container and force them into a line or vessel under pressures up to and including 100 psig. The feed rate is manually adjustable while the unit is in motion, by means of a single stroke adjusting knob which controls the amount delivered from each head, or by changing the position of a V-belt on 3-step cone pulleys. For heavy duty use on liquids and slurries at temperatures not exceeding 100 F. %Proportioneers, Inc.%, Providence, R.I.

New Product Briefs . . .

▶ DOUBLE SOLENOID VALVE—Model DDS-4-375 is a corrosion resistant double operated solenoid valve for air and low pressure hydraulic cylinders. With it, pressure may be held on one side of the cylinder for a given period of time; also speed of cylinder may be controlled. Available in ¼, ⅜ and ½ in. orifice area. Airmatic Valve, Inc., 1643 E. 40th St., Cleveland, Ohio.

▶ SYNCHRONOUS-MOTOR TIMER—This type SY Promatic Timer can be used for all time periods between ½ second and 24 hours. It automatically resets for each new cycle. Available for either 115 or 230 volts a-c, the timer has a unique assembly which eliminates gears. General Control Co., Boston 34, Mass.

▶ COATING—ALKALOY 550 is a high solids liquid coating which is resistant to all alkalies, solvents, salts and most acids. It dries to a jet black resilient solid, with high flexibility. The product is based on furfuryl alcohol. Atlas Mineral Products Co., Mertztown, Pa. and Houston, Tex.

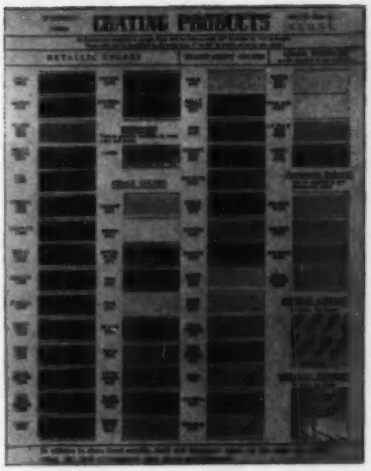
▶ HUMIDITY INDICATOR—Humigraph is a simple card measuring 6¾ x 1⅞ in. with a column of seven color spots calibrating relative humidity from 10 to 70 per cent. It responds in from ten to thirty minutes, and is useful as an insert for long term packaging or for spot checking of humidity without instruments. Andrew Technical Service, 3805 N. Clark St., Chicago 13, Ill. Ill.

▶ TUBE FITTINGS—A line of stainless steel pipe couplings permits different sizes of tubing, or tube-pipe combinations, to be joined in a single fitting. This eliminates the need for supplementary reducing couplings. Special Screw Products Co., 5445 Dunham Rd., Bedford, Ohio.

▶ HYDROGENATOR—The Struthers Wells Hydrogenator is individually built for each application, and is designed for quick dispersion of gases and solids under specific conditions of pressure, vacuum, temperature and degree of agitation. Featuring the Radial Propeller Agitator, the mechanism is adjustable to the degree and type of agitation necessary. Struthers Wells Corp., Warren, Pa.

▶ ELECTRIC BRAKES—A series of electrically-operated brakes and clutches are self-synchronizing and replace multi-control mechanical or hydraulic systems in some applications. The unit has been especially successful on high-speed warping machines in the textile industry. Warner Electric Brake & Clutch Co., South Beloit, Ill.

▶ MASONRY COATING—To solve the problem of patching and painting stucco, cement and masonry in one application, a Silicated Rubber Coat Exterior Finish has been developed. It acts as filler and finish coat combined, and is almost indestructible. In white or with tints. Wilbur & Williams Co., 130 Lincoln St., Boston 35, Mass.

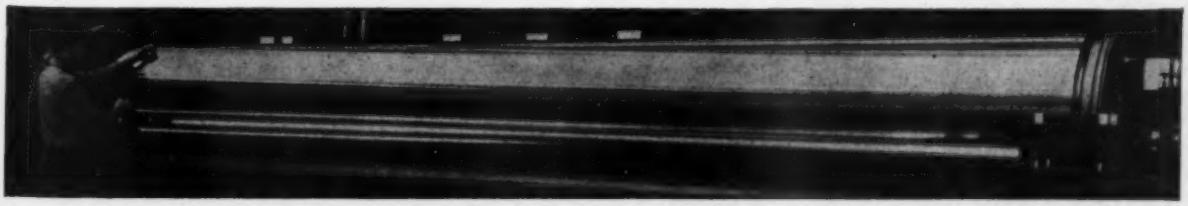


Sample Display Board

Actual samples of metallic and coated acetate plastics are displayed on a 9 x 12 in. board for convenient selection. All materials shown are available in gauges from .003 to .020, and in 750-ft. rolls, slit webs, or sheets cut to size. Coating Products, 136 W. 21st St., New York 11, N.Y.

▶ AIR SAW SHARPENER—Hanchett Model 772 circular saw sharpener now employs air power in the shift mechanism of its grinding head. As a result, more than 25 parts have been eliminated and smoother operation is obtained. For saws 20 to 72 in. in diameter, or specially built for larger saws. Hanchett Mfg. Co., Big Rapids, Mich.

▶ GENERATORS—Radio-frequency generators in two ratings will dielectrically heat a wide range of non-metallic materials. A 5 kw. model is available in two styles: with a 6.8/13/6-megacycle dual-frequency oscillator for low and medium power density requirements, and with a 27.1-megacycle oscillator for high power density. A 20 kw. model is also available. Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Pa.



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The Paper Industry New Literature

Books

PHILLIPS' PAPER TRADE DIRECTORY OF THE WORLD. Published by S. C. Phillips & Co., Graham House, 3 Tudor St., London, England. 8¼ x 5¼. 725 pages. £1.17.6, postpaid.

The 1951 edition of this standard papermakers' reference brings all previous listings and data up to date. As in previous editions, a complete cross-index listing of all advertisers and their products, a glossary of terms in six languages (English, French, Swedish, German, Spanish, Italian), and a compilation of English export laws is included.

Such miscellaneous information as British standard sizes for paper and equivalent weights of printing papers form sections of the book.

Not only does the Directory list the leading paper, wood pulp and allied trades associations existing in Britain, but it gives as well the address and officials of each such group.

The major part of the volume is devoted to information concerning British paper and pulp mills and converters, but similar information is included about mills and converters in nearly every papermaking country in the world. All classifications are subclassified for easy reference to specific details.

Not only is an extensive listing of watermarks claimed by specific firms included, but an extensive section of drawings of the watermarks of Finnish and Norwegian papermakers may also be found.

UNIT OPERATIONS, edited by George Granger Brown. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. 8½ x 11. 611 pages. $9.00.

Eleven academic authorities from several of the country's leading technical universities have joined with Mr. Brown in compiling a comprehensive treatment of modern process operations which stresses the similarity of their basic principles.

Four main sections (1) Solids, (2) Fluids, (3) Separation by Mass Transfer; the Ideal Stage Concept, (4) Energy and Mass Transfer Rates—are subdivided into many parts for easier understanding. The book, originally designed as a text on design and operation of processing equipment, requires a knowledge of physics, calculus and thermodynamics; material is presented in the order of increasing difficulty.

Similar operations are grouped together and a common nomenclature is used for theoretical discussions. Unit operations are associated and compared so that the engineer may select the most suitable operation and equipment desired for each step in a process.

Each section is profusely illustrated with photographs, drawings, diagrams, and tables presented in adequate size. A four page alphabetized listing of nomenclature used in the book makes interpretation of formulae and discussions less difficult; an appendix which tabulates liquid-level equilibria, vapor-liquid equilibria, volatility equilibrium distribution rations, thermal conductivities, etc., for a total of 11 pages should be extremely valuable; many appendix tables are a full page in size. A complete cross-index concludes the volume.

AUSTRALIAN PULP AND PAPER INDUSTRY TECHNICAL ASSOCIATION PROCEEDINGS 1950. Volume 4. Published by Australian Pulp and Paper Industry Technical Association, P. O. Box 18, South Melbourne, Victoria, Australia. 408 pages.

This volume comprises the complete proceedings of the fourth annual meeting of the Association, including both discussions and papers presented in Melbourne, Australia, March 6-10, 1950. Twenty-five papers are given in their entirety, with illustrations, tables, diagrams, photos and bibliographies of references where needed.

All illustrative material is of a large size —several diagrams and tables are more than a page in length.

Retiring Chairman H. E. Dadswell's opening address concerns itself with the progress of the four-year-old Australian Association.

Typical of the papers presented are: "Failure of a Pulp Mill Digester," "Bleaching Eucalypt Soda Pulp," "The Swelling Behaviour of Conifer Tracheids and the Concept of Skin Substance," "The Design of Power Plants for the Pulp and Paper Industry," and "Notes on Handling Pulp Suspension."

As in preceding volumes, Volume 4 concludes with a register of members present at the meeting.

PROCEEDINGS OF THE PETROLEUM PRODUCTS PACKAGING SEMINAR. Published by the Packaging Institute, 342 Madison Ave., New York 17, N.Y. $2.50.

Noted men in the fields of petroleum and packaging participated in this seminar. Subjects covered, and their authors, include: Policy of the Petroleum Committee, R. C. Reed; Mechanical Handling of Small Packages, F. N. Landon, Sun Oil Co.; Economics of Labeling, G. E. Steever, Atlantic Refining Co.; A Case History on the Use of Decals for Marking Packages, R. B. Morse, Morse Decals; Economics of Stenciling, Frank G. Marshall, The Texas Co.; Standardization for Palletizing, C. L. Lockhart, Shell Oil Co., Export Shipping Cases for Petroleum Products, Paul Paulsen, William H. McGee and Co., Inc.

Additionally, sections are included on Streamlining Petroleum Packaging, by A. D. Murphy, Esso Standard Oil Co.; and Packaging for the National Military Establishment, Clinton K. Royce, Department of the Navy.

PROCEEDINGS OF THE HIGH SPEED PACKAGING SEMINAR. Published by Packaging Institute, 342 Madison Ave., New York 17, N.Y. $1.00.

This book is a transcript of the material presented at the High Speed Seminar. High Speed packaging in four types of containers is considered: Glass Lines, as commented upon by J. K. Dotts, of Jas. E. Seagram & Sons, Ltd.; Carton Lines, as related by William T. Schommer, General Mills, Inc.; Squeeze Bottle Lines, as discussed by G. D. Harrison, The Mennen Co.; and Tin Can Lines, as considered by George Waldron, F. & M. Schaefer Brewing Co.

UNIVERSITY OF MAINE LECTURES ON PULP AND PAPER MANUFACTURE. Edited by Professors Lyle C. Jenness and John Lewis of Maine's chemical engineering department. Published by Lockwood Trade Journal Co., Inc., 15 West 47th St., New York 19, N.Y. 199 pages. 8½ x 11½. $5.00.

This book, a reprint of the 40 lectures which make up the Industrial Course in Pulp and Paper Manufacture offered by the University of Maine, is divided into two sections. Section 1 concerns itself with more than twenty essays—lecture transcripts—on pulp. Leading men in industry have authored such lectures as Chemistry of Cellulose and Wood, Mechanical Pulping, Neutral Sulphite Semichemical Pulping Process, and Evaluation of the Modern Recovery Unit for Soda and Sulphate Pulp Mills.

Section 2—paper—is the other group of lecture transcripts which, presented by well-known industry men, completes the Maine lecture course. Subjects given in this section include The Rag Paper Industry, Color Engineering, Drying of Paper, Colloid Technology in Papermaking, and Personnel Management.

Lectures, rewritten or prepared for publication by the book's editors, present many sketches and illustrations; the author of each lecture is presented both by photograph and a short biographical sketch.

DEVELOPMENTS IN OFFICE PERSONNEL ADMINISTRATION, Office Management Series No. 127. Published by American Management Association, 330 West 42nd St., New York 18, N.Y. Paperbound. 52 pages. 9 x 6. $1.00; $1.25 to non-members.

This book is a compilation of papers presented at the Office Management Conference of the Association held in October.

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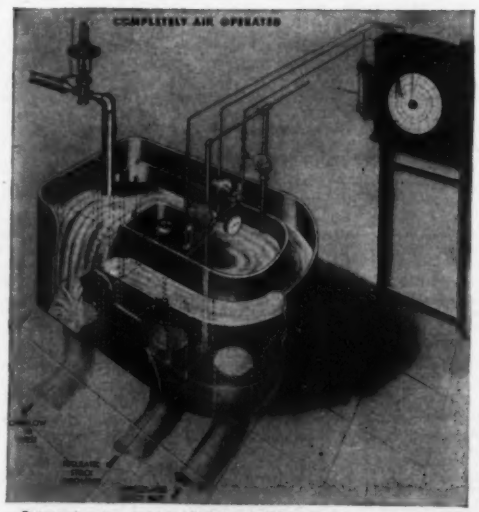

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Five papers are included: A Supervisory Training Program that Works, Charles M. Skade; Employee Communications, A Number One Job: The General Motors Story, Milton E. Mumblow; The White Collar Worker in the American Economy, Robert K. Burns; Defense Production and the National Economy, Sumner H. Slichter; and Economic Mobilization Challenges Office Management, Eldridge Haynes.

Material presented in this publication should be of definite value to anyone responsible for the supervision of employees; today, the sections on defense production and national economy should be of particular interest.

COMPREHENSIVE ANALYSIS OF ACCIDENT STATISTICS. Published by St. Regis Paper Co., 230 Park Ave., New York 17, N. Y. This 10-page booklet (8½ x 11) is a compilation of accident data in all of the St. Regis mills for a three-year period, 1948-1950. The purpose of this booklet is to acquaint the employees with the safety standards of the company and to present the achievement of the different mills in the reduction of accidents.

THE MUSKINGUM STORY, published by The American Forestry Association, 919 Seventeenth St. N.W., Washington, D.C. 16 pages. 11 x 8½. Single copy, 50c; 25-999 copies, 30c each; more than 999 copies, 22c each. This illustrated booklet describes one of America's outstanding flood control watershed management projects, the Muskingum Water Conservatory District of Ohio. The Muskingum project is used in this booklet to demonstrate the value of small, locally developed watershed units in flood control, wise use of water, and proper forest management.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified by writing direct to the manufacturers. Please address requests on your company letterhead.*

Flooring. Dura-Tred Co., 357 N. Central Park Blvd., Chicago 24, Ill.—A 4-page booklet gives a picture story of the use of "Quick-Floor," a ready mixed plastic solid for repairing and patching concrete floors. It is said to be ready for use instantly after application.

Continuous Beating System. Sutherland Refiner Corp., Trenton 6, N.J.—The newly developed Sutherland High Yield Sulphate System is briefly introduced in a 4-page brochure. Characteristics of the refined pulp are covered, the process is explained in a few words, and costs and savings are outlined.

Lime Hydrators. Hardinge Co., Inc., 240 Arch St., York, Pa.—An 8-page catalogue, No. 49, covers the continuous lime hydrators in theory and construction. The features combining Schultheiss, McGann and Kuntz hydrators are described. Other lime treating equipment is described briefly.

Washer System. Sutherland, Inc., Trenton 6, N.Y.—A 4-page brochure gives some details on Pressure Washing, a new washer-thickener operation designed to cut costs and increase uniformity of washing. Diagrams of the system are included.

Stud Welders. Nelson Stud Welding Div., Morton Gregory Corp., Lorain, Ohio—A 4-page bulletin describes two Nelwelder power units designed to improve and extend the advantages of stud welding. One model is for studs up to ⅝ in.; the other, battery-operated, welds studs up to ½ in.

Fitting Data. Taylor Forge & Pipe Works, P.O. Box 485, Chicago 90, Ill.—Condensed on two sides of an 8½ x 11 in. card are dimensions on welding fittings and flanges that could otherwise be found only by searching through many Taylor Forge catalogues and tables. Fittings for pipes from ½ to 30 in., and flanges for ½ to 24 in. pipe are covered.

Lift Trucks. Towmotor Corp., Cleveland 10, Ohio—A 4-page Standard Specifications Folder contains complete data on Towmotor fork lift trucks, tractors and electric pallet trucks. Concise information on capacities, dimensions, etc., is given.

Water Conditioning. Rohm & Haas Co., Resinous Products Div., Washington Sq., Philadelphia 5, Pa.—"Zero Hardness Carbon Dioxide Silica," 4 pages, describes Amberlite silica-removing deionization of water. Four systems of various capacities are pictured.

Card Systems. Remington Rand Inc., 315 Fourth Ave., New York 10, N.Y.—Booklet TM-596, "Production Control in Manufacturing Industries," 40 pages, suggests punched-card methods of production control. Included are engineering records and procedures, production and forecastings, material control, scheduling and progress reports. Scheduling defense orders is also covered.

Steam Controlling Instruments. Velan Engineering Co., 1 Exchange Pl., Jersey City, N.Y.—A number of data sheets describe such apparatus as the Velan steam trap, superfast thermometer, hygrometer, polymeters, and the Crustex super-sonic wave lime scale remover.

Model Valve. Paul Valve Corp., 683 Third Ave., New York 17, N.Y.—A unique cardboard working model of the high-performance Paul valve with Venturi-Ball principle demonstrates the operation of the valve. Action of the ball cage in closing and easy opening are shown. Size of model is 4½ x 8⅝ in.

Control Film. Instrument Society of America, 921 Ridge Ave., Pittsburgh 12, Pa.—A 6-page leaflet and order blank introduces the new 55-minute color and sound film, 16 mm., entitled "Principles of Automatic Control." Produced as one of the Society's educational projects, it presents the subject to students, technical personnel, mechanics, and supervisors.

Steel and Alloys. Lunkenheimer Co., Box 360-AA, Cincinnati 14, Ohio—Two comprehensive brochures describe this company's cast steels and copper base alloys, for piping and other equipment. The information deals with the basic problems of metal soundness, porosity, welding, new alloys, code conformance, etc.

Seamless Tubing. Babcock & Wilcox Tube Co., Beaver Falls, Pa.—Technical data card TDC 136 gives specifications on the chemical compositions of the Croloy steel alloys used in B&W seamless tubing for high-temperature service. Data is according to ASTM specifications.

Instrument Catalogue. Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—A 4-page Condensed Catalogue gives a selection of typical indicators, controllers and combustion safeguards. In addition, a 4-page price list gives descriptions and current prices of nearly all the standard instruments made by this company.

Packaging Latices. B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O.—A 4-page booklet on Geon polyvinyl materials for packaging applications contain a complete summary chart of Geon latex products for package coatings. The booklet itself is coated with a glossy Geon solution.

Fork Lift Truck. Mercury Mfg. Co., 4044 S. Halsted St., Chicago, Ill.—A 4-page bulletin is devoted to the new 2000 lb. Jeep fork truck, Model 230. Its 130-in. lift, automotive steering, low pressure hydraulic lift and control system are described, and diagrams are given.

Chains and Sprockets. Jeffrey Mfg. Co., Columbus, O.—Catalogue No. A418 covers the complete line of chains and sprockets for both new and replacement service on elevating and conveying equipment, and for drives. Particular emphasis is given to drive chains, as well as all types for regular applications.

Variable Speed Drive. Worthington Pump and Machinery Corp., Harrison, N.J.—Bulletin AS-1600-B3 gives detailed drawings and specifications of the Allspeed Drive, in six models from 1 to 15 hp. Photographs showing typical installations are included.

Rubber Belts. B. F. Goodrich Co., Akron, O.—A 26-page catalogue section covers ten types of conveyor and elevator belts. Profusely illustrated with schematic drawings and photographs.

Light-Weight Pipe. Naylor Pipe Co., 1230 E. 92nd St., Chicago 19, Ill.—A 4-page bulletin shows typical applications of Lockseam Spiralweld Pipe. Data on pipe from 4 in. to 30 in. is given, and special Naylor fittings are described.

Fork Trucks. Baker Industrial Truck Div., Baker-Raulang Co., 1250 W. 80th St., Cleveland 2, O.—Bulletin 1324, 8 pages, describes design and construction features of Type FT fork trucks, in 3000 and 4000 lb. capacity. Fourteen special attachments are also illustrated.

Speed Reducers. Cleveland Worm & Gear Co., 3293 E. 80th St., Cleveland 4, O.—An 8-page bulletin introduces Cleveland worm gear speed reducers, showing a few typical models in varied installations. Speedaire, vertical drives and worm-gear sets are included.

Electronic Recorder. Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—Bulletin C2-2, 4 pages, describes the Wheelco Capacilog line of electronically operated strip chart recorders. Model numbers and specifications are listed, and a separate price list supplements the bulletin.

Soot Blower. Vulcan Soot Blower Div., Continental Foundry & Machine Co., DuBois, Pa.—Bulletin 485, 4 pages, tells simply and clearly how the new Vulcan P-3 rotary soot blower head keeps boilers clean. Low maintenance is emphasized.

Corrosion Inhibitor. Allis-Chalmers Mfg. Co., 991 S. 70th St., Milwaukee, Wis.—A single-page leaflet, 25X7582, explains the action and use of the No. 160 series corrosion inhibitor, a liquid for steam and condensate line protection. Use of the inhibitor is recommended where expenditures for deionizers or zeolite softeners are not justified.

Stainless Steels. Babcock & Wilcox Tube Co., Beaver Falls, Pa.—Bulletin TDC 140, 4 pages, covers three straight chromium stainless tubing steels, developed to avoid the nickel shortage. Technical data is given on analyses, creep strength, corrosion and oxidation resistance, machining and heat treatment.

Metal Bellows. Chicago Metal Hose Corp., Maywood, Ill.—Catalogue CMH-113, 16 pages, covers the "Flexon" line of metal bellows and bellows assemblies. Applications in the control and regulating field, as well as others, are suggested, and complete specifications are given.

Chain Shaft Couplings. Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.—Folder No. 2363, 4 pages, is on "RC" roller chain flexible shaft couplings. Detailed engineering data is given for proper application. Also discussed are two types of protective grease-retaining casings.

Testing Service. Experimetrics, Inc., Station 1, Buffalo 22, N.Y.—"Experimetrics," an 11-page booklet, introduces a consulting service for the design, analysis and interpretation of experiments on laboratory, pilot plant and full production scale. Subjects covered in the

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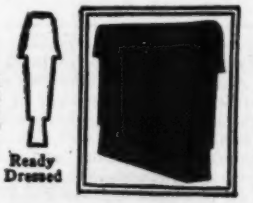

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booklet are Experiments, Correction Analysis, Quality Control and Experimetrics Service.

Expansion Joints. Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, Pa.—Bulletin EJ-1912, 16 pages, is available in a new 1951 edition. It covers expansion joints for use under pressure. Both Gun-pakt and Glan-pakt types are listed.

Valve Sizing Charts. Fischer & Porter Co., Hatboro, Pa.—A single sheet contains Steam Valve and Butterfly Valve sizing charts. The first chart covers range from 1 to 1,000,000 lb. per hr., and the second from 15 to 10,000 gpm.

Speed Control and Tachometer. Reeves Pulley Co., Columbus, Ind.—Bulletin G-509, 12 pages, gives basic operating principles of Reeves variable speed drives and contains rating tables. Bulletin G-511, 2 pages, gives all necessary information for ordering the Reeves electrical tachometer. Included are diagrams showing dimensions and method of mounting to transmission.

Batteries. Electric Storage Battery Co., Philadelphia 32, Pa.—A catalogue consisting of an information booklet and five data pages describes the line of Exide Ironclad storage batteries for materials handling and haulage vehicles. Exclusive features are pointed out and service records are given.

Truck Attachments. Towmotor Corp., Cleveland 10, O.—A 4-page folder, "Extra Arms and Hands for Towmotor One-Man-Gang," pictures standard accessories for these lift trucks. Such devices as the crane arm, unloader, ram, bale clamp and multiple drum carrier are covered.

Felt Washing Methods. Oakite Products, Inc., 116 Thames St., New York 6, N.Y.—A 3-page Service Report discusses special materials for felt washing, and tells how these products are used for washing felts on or off the machine. Methods are described.

Feed Water Control. Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.—A 16-page bulletin, No. 105-C, contains a discussion of problems of feed water control and the use of the Bailey Air-Operated Three-Element System. Typical chart records of the Bailey Recorder are given.

Stainless Steel. Armco Steel Corp., Middletown, O.—"A Stainless Profit Story for the Paper Industry" is a 12-page booklet telling how and where stainless steel equipment is used to advantage in paper making. In addition, it gives practical suggestions on the care of stainless steel.

Filter-Clarifier. Hardinge Co., Inc., 240 Arch St., York, Pa.—Bulletin 30-B, 4 pages, covers the line of Hardinge Sand Filter-Clarifiers, a filter that operates without a backwash and is used where a crystal-clear filtrate is desired.

Revolving Joints. Barco Mfg. Co., 1801 W. Winnemac Ave., Chicago 40, Ill.—Catalog No. 300, 8 pages, gives all specifications and engineering data on the complete line of revolving joints, which are one of this company's four types of rotary seals. Designed for steam or cold service, and for speeds up to 2500 rpm.

Fork Trucks. Buda Co., Harvey, Ill.—Two single-sheet bulletins, Nos. 1536 and 1537, cover the 24-in. and 15-in. load center models of the new FB20 fork lift truck, designed for low-cost lifting, carrying and stacking. Complete operating data is given.

Overload Signal. W. C. Dillon & Co., 1421 S. Circle Ave., Forest Park, Ill.—A single sheet explains the advantages and uses of the Automatic Overload Signal, visual-audible model, for applications where power cut-off is undesirable but some signal is needed. For use on hoists and cranes.

Synchronous Generators. General Electric, Schenectady 5, N.Y.—Bulletin GEA-5470, 4 pages, announces four designs in high-speed synchronous generators in ratings from 1.875 to 50 kva, with frequencies of 60 and 400 cycles. Comparison ratings are given in table form.

Woodworking Machinery. DeWalt, Inc., Lancaster, Pa.—A 12-page catalogue covers tools and attachments for DeWalt power woodworking machines. Included are saw blades of all kinds, cutter heads, abrasives, bits, guards, and a jig saw and lathe.

Soot Blower. Vulcan Soot Blower Div., Continental Foundry & Machine Co., DuBois, Pa. —Bulletin 486, 4 pages, explains operation of the rotary soot blower head in stationary installations. Performance is cited from its use in the marine field.

Research Instruments. Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Philadelphia 44, Pa.—An 84-page book, "Instruments Accelerate Research," describes many types of equipment used in research and analytical studies. An important reference guide, covering devices made by many manufacturers. Data sheets used in the book are available for schools and training programs.

Alloy Data. The International Nickel Co., Inc., 67 Wall St., New York 5, N.Y.—A 6-page data sheet, No. NS-3, gives standard composition and other technical data on nickel-chromium-molybdenum steels, types 8600-8700 series.

Motor Starters. Allis-Chalmers Mfg. Co., 991 S. 70th St., Milwaukee, Wis.—A 12-page bulletin, No. 14B6410A, describes Type H high-interruption-capacity motor starters, all parts of which are built into a steel cabinet. A second bulletin, No. 14B7303, describes air break and oil immersed contactors for use in these assemblies.

Bushings. General Electric, Schenectady 5, N.Y.—Bulletin GEC-715, 12 pages, details a new standardization program which replaces more than 1000 different types of transformer and circuit breaker bushings with only 38 standard bushings. These are listed and their applications described.

Water Cooler. Mayer Refrigerating Engineers, Inc., Rutherford, N.J.—4 pages cover the Chil-Er, an industrial water or brine cooling unit that is completely self-contained when connected to water and power lines. Nine models are described.

Floor Conveyors. Jervis B. Webb Co., Detroit, Mich.—Floor Type Conveyor Catalogue No. 51, 90 pages, contains information on conveyor chains and many types and parts of floor conveyors. Engineering data for the conveyor designer has been condensed to five pages.

Controls. Foxboro Co., Foxboro, Mass.—Two data sheets of interest to pulp manufacturers are No. 260-9, "Rotary Sulphur Burner Control System" and No. 260-13, "Pulp Flow Control." Part of a series for specific processing operations in the pulp and paper industry.

Weightograph. Howe Scale Co., Rutland, Vt. —A 4-page folder (Form 668) illustrates and describes important features of the 77 Weightograph, an accessory for beam scales. Accuracy and easy readibility of the unit are stressed.

Fire Brick. Johns-Manville, 22 E. 40th St., New York 16, N.Y.—"JM-3000 Insulating Fire Brick" is a 4-page folder presenting the refractory properties and applications of this insulating fire brick for sustained use at 3000 F. Physical and thermal characteristics are given in table form.

Fire Extinguishers. Randolph Laboratories, 8 E. Kinzie St., Chicago 11, Ill.—A 16-page booklet vividly shows and describes fire hazards and their use of Randolph fire extinguishers and extinguishing systems in many models. The "panic-proof" carbon dioxide type is featured, and other models are described.

Stainless Tubing. Babcock & Wilcox Tube Co., Beaver Falls, Pa.—Technical Bulletin 19 contains condensed data on analyses, oxidation resistance, thermal treatment and mechanical, electrical and physical properties on ten of the most popular austenitic and ferritic stainless tubing steels. 4 pages.

FOR SALE—Six cylinder board machine including primary and main presses, dryers, calender stacks, cutter, etc., suitable for manufacture of board or paper usually made on cylinder machines. Address: Box 521, The Paper Industry.

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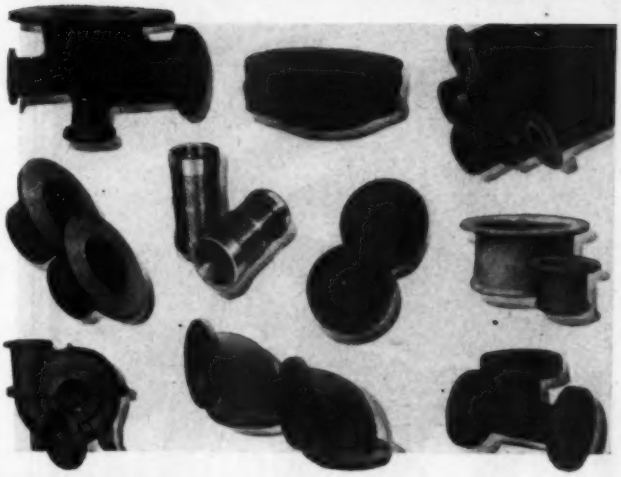

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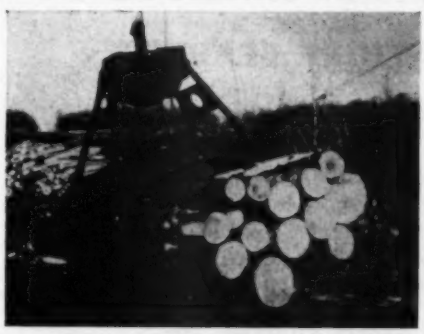

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MARKET QUOTATIONS

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	per cwt.
Blue Overalls	14.50
Corduroy	8.00
Washables, No. 1	6.50
Percales	12.50
Light Prints, No. 1	11.50
Khaki Cuttings—	
Sun Tan	11.50
Mixed	8.00
New White Canvas	19.00
Canton Flannels, bleached	21.00
Canton Flannels, unbleached	21.00
Shirt Cuttings—	
New White No. 1	21.00
Silesias No. 1	16.00
New Unbleached	21.00
Fancy	10.00
Linen Cuttings—	
American	14.50
White	21.00
Grey	21.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.	
Roofing—		
No. 1	2.30 to	2.40
No. 2	2.20 to	2.30
No. 3 and 4	2.10 to	2.20
Twos and Blues—		
Repacked	4.75 to	5.00
Thirds and Blues—		
Repacked	4.25 to	4.50
Miscellaneous	3.75 to	4.00
Whites, No. 1—		
Repacked	5.75 to	6.00
Miscellaneous	4.50 to	4.75
White, No. 2—		
Repacked	4.25 to	4.50
Miscellaneous	3.50 to	3.75

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

Gunny No. 1—	per cwt.	
Foreign	8.00 to	8.25
Domestic	8.25 to	8.50
Wool Tares—		
Light	9.50 to	10.00
Heavy	10.00 to	11.00
No. 1 Scrap Bagging	7.25 to	7.50
Manila Rope—		
No. 1 large	9.00 to	9.50
No. 1 small	8.00 to	8.50
Sisal Rope—		
No. 1 large	8.00 to	8.50
No. 1 small	7.50 to	8.00
New Burlap Cuttings	9.00 to	10.00
Jute Threads—		
Foreign (Nom.)	7.50 to	8.00
Domestic	7.50 to	8.00
Strings—		
No. 1 sisal	5.50 to	5.75
No. 2 sisal	5.00 to	5.25
Soft jute	5.25 to	5.50
Mixed	3.50 to	3.75

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Shavings—	per ton
Hard White Env. Cuts	235.00—
Hard White, No. 1	190.00—
Soft White, No. 1	140.00—
Soft White, one-cut	155.00—
Soft White, Misc.	135.00—
Fly Leaf, No. 1	80.00—
Fly Leaf, Woody No. 1	60.00—
No. 2 Mixed Col. Woody	50.00—
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	55.00—
Mixed Books	33.00—
Ledger Stock—	
No. 1 White	135.00—
No. 1 Mixed (Colored)	90.00—
Manilas—	
New Env. Cuttings	135.00—
New Env. Cuts, One-Cut	—
Extra Manilas	85.00—
Manila Tab Cards, Free of Ground Wood	150.00—
Colored Tab Cards	110.00—
Kraft—	
New Envelope Cuttings	150.00—
Tripled Sorted No. 1 100%	100.00—
No. 1 Old Assorted	80.00—
News—	
White Blank	95.00 to 100.00
Overissue	27.00—
No. 1 Folded	23.00—
Old Corrugated Container	65.00—
New Jute Corrugated Cuts	60.00—
Mill Wrappers	22.00—
Box Board Chips	20.00—
No. 1 Mixed Paper	20.00—

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Alum (Papermakers)—		
Lump, cwt.	4.55—	
Ground, cwt.	4.30—	
Powdered, cwt.	4.70—	
Blanc Fixe—		
Pulp, bulk, ton	90.00—	
Dry, barrels	95.00—	
Bleaching Powder—		
Drums, cwt.	5.00 to	6.00
Casein (Domestic Standard)		
20-30 mesh (bags), lb.		
80-100 mesh (bags), lb.	40.00 to	41.00
Argentine, lb.	39.00 to	40.00
China Clay—		
Domestic Filler Bulk (mine) ton	10.00 to	15.00
Domestic Coating Bulk (mine) ton	15.00 to	25.00
Imported (ship side) Bulk (lump) ton	22.00 to	30.00
Chlorine—		
Tank cars (wks) cwt.	2.80 to	3.05
Gelatine (silicin), lb.	1.25 to	1.35
Glye. (C.P.) drums, lb.	.50 to	.55
Litharge, powd. bbl. lb.	.18¾ to	.20

Rosin (Gum)—	New York, per 100 lbs.
E	10.15—
F	10.15—
G	10.15—
WW	10.65—
Rosin (Wood), carlots, F.O.B. South	7.30—

MARKET QUOTATIONS

Salt Cake—		
Dom. bulk (wks) ton	22.00 to	24.00
Imp. bulks on dock—(Atl. ports) ton (Nom.)	25.00—	
Soda Ash—		
Bulk (works) cwt.	1.25—	
Paper bags, cwt.	1.50—	
Soda (Caustic)—		
Solid drums, cwt.	3.35 to	3.40
Ground and flake, drums, cwt.	3.75 to	3.85
Sodium Silicate—		
60 deg. 55 gal. drums, (works) cwt.	1.80 to	1.90
40 deg. 55 gal. drums, (works), cwt.	1.50 to	1.60
Starch—		
Pearl, 140 lb. bags, cwt.	6.00—	
Pearl, barrels, cwt.	6.00—	
Paper (Sp.) bags, cwt.	6.00—	
Powdered, barrels, cwt.	6.32—	
Sulphur (Crude)		
(Mine) bulk, long ton	22.00—	
Talc—		
Dom. 100 lb. bags (mine) ton	25.00 to	28.00
Canadian	35.00 to	45.00
Titanium Dioxide—		
Barium Pig. bbls., lb.	.21 to	.21½
Calcium Pig. bbls., lb.	.21 to	.21½
Zinc Sulphide, bbls., lb.	11.50 to	11.75

WOOD PULP

The following are OPS ceiling prices on domestic wood pulp, dollars per short air dry ton delivered consuming mills including the basic maximum freight allowances as provided:

Bleached sulphite	140.00—
Unbleached sulphite	132.50—
Bleached sulphate	145.00—
Semi-bleached sulphate	140.00—
Unbleached sulphate	132.50
Bleached soda	140.00—
Ground wood	92.50—
Sulphite screenings	72.50—
Sulphate screenings	67.50—
Ground wood screenings	60.00—
Unbleached sulphate siderums	132.00—
Standard news print siderums	92.50—

OPS ceiling prices on European wood pulp, dollars per short air dry ton, on dock at American Atlantic ports, folow*

Bleached sulphite	225.00—
Bleached sulphate	230.00—
Unbleached sulphite	200.00—
Unbleached sulphate	200.00—

PAPER

f.o.b. New York City

Boards—	per ton
Binders	140.00—
Chip	105.00—
Chip, tube and can	115.00—
Chip, full blending	117.50—
Chip, sgl. mls. lined	130.00—
Coated, white patent .016	170.00 to 180.00
.020 and heavier	160.00 to 170.00
Kraft liner	115.00—
Filled News	107.50 to 110.00
Container	130.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ton lots)
Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	17.40—
B Grade E. F.	17.65—
A Grade S. C.	18.15—
B Grade S. C.	18.90—
No. 2 Uncoated Offset 4 sides, White	—
Machine Coated White	
No. 1 Glossy	23.40—
No. 2 Glossy	21.90—
No. 3 Glossy	20.40—
No. 4 Glossy	—
No. 2 Offset	17.40—
C1S Lithe (Varnish)	—
C1S Lithe (Non-Varnish)	—

Writing Papers—f.o.b. mill with some quantity, packing and other differentials allowed:

Rag Content Bond— (In Ton Lots)	per cwt.
Extra 100% Rag	76.45—
100% Rag	42.45—
75% Rag	48.15—
50% Rag	38.90—
25% Rag	31.65—

Rag Content Ledger— (In Ton Lots)	per cwt.
Extra 100% Rag	72.65—
100% Rag	63.90—
75% Rag	49.40—
50% Rag	40.20—
25% Rag	33.00—

Sulphite Bond—	per cwt.
Air dry, watermarked	—
No. 1 watermarked	19.05—
No. 2 watermarked	18.10—
No. 4 watermarked	17.10—

Sulphite Ledger—	per cwt.
No. 1 watermarked	21.15—
No. 2 watermarked	21.00—
No. 4 watermarked	20.40—

Glassine (f.o.b. mill)—	per cwt.
Embossed (25 lb. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof—	
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—

News—	per ton
Rolls, Standard (Contract)	106.00 to 116.00
Rolls (Spot)	(Nominal)
Sheets	—

Tissues (Carlots)—	per ream
White No. 1	1.95—
White No. 2	1.85—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.85—
Manila	1.95—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.90—
Napkins, full crepe and embossed (12½ lb. to M shts.) per cs.	.90—
Toilet, Bleached (M shts.) per cs.	9.85—
Toilet, Unbleached (M shts.) per cs.	6.60—

Towels	per case
Bleached	6.65—
Unbleached	5.65—

Wrappings (Kraft)—	per cwt.
Super-Standard	9.25 to 9.50
No. 1 Wrapping	8.25 to 8.50
Standard Wrapping	7.75 to 8.00
Standard Bag	7.50 to 7.75
Variety Bag	—

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f.o.b. mill)	per cwt.
Bleached Papers—	
M.F. & M.G. Waxing, 20lb. (carloads only)	—
(10,000 lb.)	—
Drug wrapp., 25 lb.	—
Unbleached Papers	
Com. Gr. Butch. 40 lb.	
No. 1 Butchers	—
No. 1 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—

Manilas—	
Envp. Mls., Sub. 16-40 (No. 1)	—
Env. Mls., Sub. 16-28 (No. 3)	—
Envp. Mls. (Prices based on large sheets untrimmed ream marked, in bdls.)	—

Wrapp. Mls. 35 lb. up—	
No. 1	8.75 to 10.25
No. 2	—

M.G. Sulphite and Kraft (other than Waxing)	
Grade B-20 lb.	—
Grade A-23 lb.	—

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- Over in the prosperous timber and agricultural belt of east Texas, the city of Nacogdoches is looking and planning for further growth. Needing more water, municipal officials called in Layne and ordered the installation of another deep well and pump unit,—the third since 1925. With this new unit in operation, the city now has a greater supply of water than is presently needed.
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Asten-Hill Mfg. Co. 365
Atkins and Company, E. C. 449
Aurora Pump Company 432

Babcock & Wilcox Tube Co. 361
Bagley & Sewall Co., The
Bailey Meter Company 356
Baker & Adamson Products, General Chemical Div., Allied Chemical & Dye Corp. 381
Barco Manufacturing Co. 341
Bauer Bros. Co., The 434
Becco Sales Corporation 369
Beckman Instruments, Inc. 376
Beloit Iron Works
Bird Machine Company 374
Black-Clawson Co., The 393
Bowsher Co., The N. P. 449
Buffalo Forge Company 423
Buffalo Pumps, Incorporated
Bulkley, Dunton Pulp Co., Inc.

Cady and Company, E. J.
Cameron Machine Co.
Carthage Machine Co.
Chain Belt Company 348
Chicago Bridge & Iron Company 344
Classified Advertising 450
Cochrane Corporation
Columbia Cellulose Co., Ltd.
Corn Products Sales Co.
Curlator Corporation 371

DeZurik Shower Company 436
Dietert Co., Harry W. 454
Dilts Machine Works 393
Downingtown Mfg. Co. 425
Draper Brothers Company 452
du Pont de Nemours & Co., E. I. 345, 351
Dura-Tred Company

Eastwood-Nealley Corporation
Electric Eye Equipment Co. 421
Electric Machinery Mfg. Co.
English China Clays Sales Corp. 451
Eriez Manufacturing Co. 389

Farquhar Company, A. B.
Fawick Airflex Company, Inc. 380
Fitchburg Screen Plate Co., Inc.
Foxboro Company, The
Fritz Publications, Inc. 434, 455
Fulton Iron Works Company 379

Garlock Packing Co., The
General American Transportation Corp.
General Chemical Division, Allied Chemical & Dye Corporation 381
Goulds Pumps, Inc. 382
Graton & Knight Co.
Graver Water Conditioning Co.

Haas Miller Corporation
Hanchett Manufacturing Co. 441
Hercules Powder Company
Hooper & Sons Co., Wm. E. 373
Hubinger Company, The 439
Hudson-Sharp Machine Company 433
Hunt Machine Co., Rodney
Huyck & Sons, F. C. 352

Improved Paper Machinery Corp. 429
Infilco Incorporated 383
Insul-Mastic Corporation of America

Jackson & Church Company 349
Jeffrey Mfg. Co., The
Jenkins Bros.
Jenssen Company, Inc., G. D. 449
Johnson Corporation, The
Jones & Sons Company, E. D. 433
Jones Foundry & Machine Co., W. A.

Kalamazoo Tank & Silo Co. 456
Kelco Company 426
Kuhns Brothers Company, The

Langston Co., Samuel M. 3rd Cover
Layne & Bowler, Inc. 453
Leeds & Northrup Company 370
Lindsay Wire Weaving Co., The 449
Link-Belt Company 355, 359
Lockport Felt Company 431
Lodding Engineering Corp.
Lunkenheimer Co., The 4th Cover

Mack Welding Company 451
Magnus Metal Corporation
Mathieson Chemical Corporation 342
Michigan Steel Casting Co. 451
Midwest Piping & Supply Co., Inc.
Milo Radio & Electronics Corp.
Modern Engraving & Machine Company
Morden Machines Company 350
Morningstar, Nicol, Inc. 395
Mt. Vernon-Woodberry Mills, Inc.
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(Continued on facing page)

Nash Engineering Co., The....436
National Aluminate Corp....1st Cover
National Conveyor & Supply Co.....
National Distillers Chemical Corp.....
National Safety Council....422
Naylor Pipe Company.....
Norton Company....367

Ohio Injector Co., The.....
Oldbury Electro-Chemical Co.....
Oliver United Filters, Inc.....
Orr Felt & Blanket Co., The.....
Owen Bucket Company, The....441

Paisley Products, Inc....395
Palmer Filter Equipment Company.....
Paper & Industrial Appliances, Inc....447
Paper and Pulp Mill Catalogue....455
Paper Industry, The....434
Perkins & Son, Inc., B. F....346
Permutit Company, The....436
Photovolt Corporation....434
Pittsburgh Piping & Equipment Co.....
Poole Foundry & Machine Co....441
Powell Company, The Wm....347
Pusey & Jones Corp., The....387

Raymond Service, Inc., Chas. P....450
Read Standard Corporation.....
Rice Barton Corporation....372
Rice Barton Research Corp.....
Rogers & Co., Samuel C.....
Rohm & Haas Company, Resinous Products Division....2nd Cover
Roots-Connersville Blower Corp....440
Ross Engineering Corp., J. O.....
Ross Heater & Mfg. Co., Inc....364
R-S Products Corporation.....

Sandusky Foundry & Machine Co....445
Sandy Hill Iron & Brass Works, The....360
Sarco Company, Inc.....
Shartle Bros. Machine Co....393
Shuler & Benninghofen....358
Solvay Sales Division, Allied Chemical & Dye Corporation....443
Standard Oil Co. (Indiana)....418
Stein, Hall & Company, Inc.....
Stickle Steam Specialties Co....439
Sutherland Refiner Corporation....357

Timken Roller Bearing Co.....
Titanium Pigment Corporation....362
Toledo Scale Company.....
Tracerlab Inc.....
Tri-Clover Machine Co....378
Turney Halsey Company.....

U.S.A.—Treasury Dept.....

Valley Iron Works Company.....
Vanderbilt Co., Inc., R. T.....

Warren Steam Pump Co., Inc.....
Waterbury & Sons Co., H....451
Waterbury Felt Co., The.....
Western Precipitation Corp....368
Weyerhaeuser Timber Co.....
Whitney Chain Company.....
Williams-Gray Company.....
Worthington Pump & Machy. Corp.....
Wyandotte Chemicals Corporation....366
Yarnall-Waring Company....353

Professional & Business Services Section
Dreshfield, Arthur C....450
Sirrine Company, J. E....450
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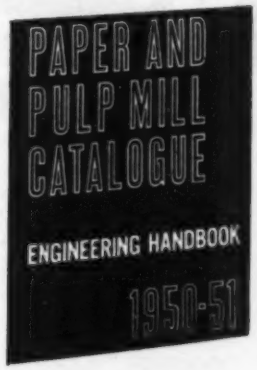

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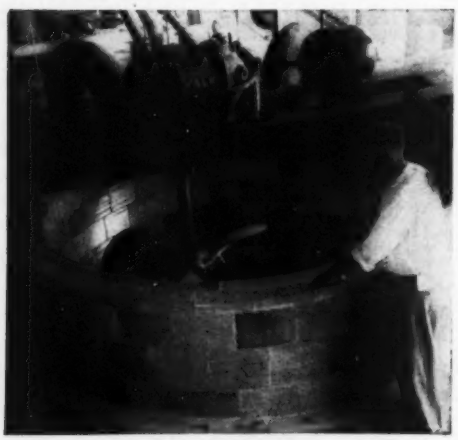

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